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U.S. SYSTEMS INTEGRATION COMPETITIVE ANALYSIS

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U.S. Systems Integration Competitive Analysis

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Abstract

This report focuses on the vendors in the systems integration (SI) market in the U.S., based on a combination of 1991 and 1992 revenues and organizational structures. Systems integration has emerged from the professional services segment of the information services industry to become a major delivery mode for products and services.

This report is based in part on a definition of SI that emphasizes the integrator's role in providing overall management of the contract, serving as the single point of contact and having responsibility for the business function, project performance, scheduling, cost, and responsibility for final delivery of a complete system. Growth has been significantly slowed in this industry segment by recession and buyer demand for faster results and consequently smaller projects. Factors such as downsizing, re-engineering, network integration, and communications have nonetheless kept it in the leading growth position in the information services industry.

This report provides a comparative analysis of the structure, business objectives, organization, financial characteristics, strategies, market focus, and capabilities of the leading SI vendors. It also discusses the emerging role of secondary SI vendors.

This report also provides descriptions of individual SI vendors, with INPUT assessments of their industry position and direction. Based on vendor surveys and independent INPUT research and analysis, trends and shifts in strategy that are occurring in this market are identified, wherever possible. Conclusions are drawn about the likely evolution of the market over the next five years.

It was prepared as part of INPUT's Systems Integration Program, which includes other reports and provides clients with a host of market research services.

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I

Introduction

While most systems integration (SI) vendors have managed to increase their business during the 1991-1992 recessionary period, only a few have managed to grow in excess of the market rate. Among those that have experienced dramatic increases are a significant number that only recently addressed systems integration as a major profit center (due to a dedicated marketing/sales effort) and hence, started from a relatively low level from which a relatively modest sales advance would be statistically impressive.

Though many vendors are reluctant to discuss profitability, it would appear that few are experiencing a significant increase. Most appear to be holding at a stable level, while some are experiencing a decline in profitability.

Even among those maintaining prior profit levels, the cost of doing so has been at the expense of personnel. Staff cutbacks have been made at some firms, while many others are demanding that their managers maintain tighter controls and achieve higher productivity with fewer resources.

The end of the Cold War and the increase in global competition has brought profound and permanent changes to the marketplace. Just as economists are struggling to define the precise nature of those changes in the global economy, so too are systems integration vendors struggling to define the elements necessary to compete successfully in their market.

Nonetheless, SI market growth is continuing. It is only the direction the industry is taking and the issues surrounding it that require significant analysis. INPUT is continuing its research begun in 1987, exploring buyer and vendor issues and current SI project characteristics, and refining its short- and long-term market projections.

For 1992, INPUT is expanding its chart of major delivery elements in the information services industry. Exhibit I-1 shows the positioning of systems integration relative to other delivery modes (as included in the 1991 report) with one addition: equipment services have now been added as a ninth delivery mode. Also, the increasing importance of "Secondary SI Vendors" to the industry is reflected in the chart as well. INPUT believes

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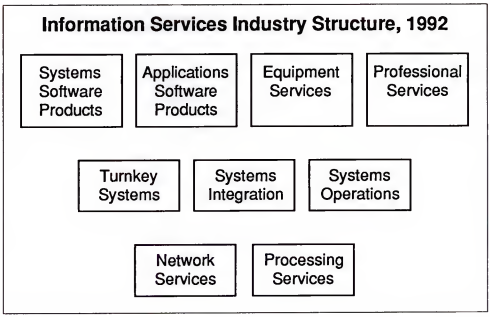
that the growing complexity of SI projects will increasingly involve the need to expand the use of such vendors, either through long-term alliances or on a contract-by-contract basis.

EXHIBIT I-1



This report must necessarily focus not only on the vendor community, but on the attitudes and requirements of buyers as well. It is the profound changes in the user community that are driving vendor responses and ultimately pushing vendors to treat systems integration as the major information services industry mode it has become.

A
Objectives

The primary object of this report is to present a current and accurate analysis of vendor position and direction in the systems integration market. As a part of that profile, a forecast of market trends over the next five years and a discussion of user requirements driving those trends will also be included. The report contains detailed discussions which are summarized in Exhibit I-2. They are:

- Individual profiles of 33 systems integration vendors with 15 profiles which were updated or newly added in 1992
- The strategies and positions of these vendors in the systems integration marketplace, as well as the degree of success they are experiencing
- The likely scenario for development of the competitive structure of SI services over the next five years

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- Buyer/user concerns that will be driving these developments; the shape they are taking today and will likely take in the years to come

In addition to the primary objective, there are several secondary objectives, also summarized in Exhibit I-2. They are:

- Describing the role of alliances in the systems integration marketplace and the problems involved;
- Showing the increasing importance of secondary system integration vendors;
- Clarification of the definitions used in describing the market and the competition.

EXHIBIT I-2

Report Objectives

Primary Study Objectives
- Vendor profiles
- Strategy and position definition
- SI five-year competitive scenario
- Buyer/user concerns driving the market

Secondary Study Objectives
- Role of alliances
- Importance of secondary vendors
- Clarification of market definitions

B
Scope and Methodology

1. Scope

This report focuses on the domestic U.S. commercial SI market. However, due to the nature of the market and competition, there is information presented that reflects developments in the federal market and, to some extent, Canada and other foreign markets.

1991 and 1992 information on revenues and markets were used wherever possible. Similarly, INPUT adjusted some vendor information when it was necessary to obtain comparisons within a common set of definitions.

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All of the other (non-financial) information used in the analysis was obtained in the period from early 1991 to late 1992 and therefore reflects the most recent data available.

2. Methodology

Information used in this analysis was obtained from three primary sources and a number of secondary sources. The primary sources of information are described below.

There were in-depth interviews conducted with 34 firms. Key contacts at each vendor site were identified, and a questionnaire (Appendix A) was mailed to the interviewee. The questionnaires returned by interviewees were clarified and/or completed over the telephone. Data from this survey was utilized in the competitive analysis and to develop individual vendor profiles.

INPUT's annual vendor survey also provided significant data for the study. Each year INPUT surveys approximately 950 companies in the information services industry. Current revenue data collected on SI vendors, vertical markets, and professional services was used in analyzing SI competitive trends.

Each year INPUT surveys approximately 250 of the Fortune 500 information systems executives on budgets, issues, technology, and trends. In the 1992 survey, information specific to the use of outside services and systems integrators was collected and has been used in the systems integration competitive analysis.

EXHIBIT I-3

Primary Information Sources

- In-depth interviews with 34 SI vendors
- INPUT's Annual Vendor Survey
- INPUT'S annual survey of 250 of the Fortune 500

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In addition to these primary sources, some secondary sources of information were used in the analysis. These are summarized in Exhibit I-4.

EXHIBIT I-4

Secondary Information Sources

- Vendor-provided publications
- INPUT's 1992 market forecast
- INPUT's proprietary vendor files
- *U.S. Systems Integration Markets, 1992-1997**

* INPUT report

Most of the data collected from the vendor surveys were tabulated, and individual profiles were prepared using all data sources.

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Senior INPUT personnel conducted in-depth interviews with senior managers of 34 systems integration vendor firms during the period of 1990-1992. Exhibit I-5 describes the subject areas of those interviews.

EXHIBIT I-5

Interview Subject Areas

- Background and strategy
  - Skills and capabilities
  - Business objectives
- SI organization/responsibilities
  - Organizational structure
  - Key contacts/number of personnel
  - Centralization of function
  - Distribution of personnel by skill
- Contract characteristics
  - Mainframe versus distributed
  - Service components
- Financial characteristics
  - Revenues/margins/profitability
  - Pricing policies
- Strategies and markets
  - Vertical and functional focus
  - Method of prospecting
  - Positioning/promotion
  - Capabilities and products
  - Competitors
  - Alliances

Fifteen interviews were conducted in 1992. Seven of those updated prior vendor profiles; eight were first-time interviews/profiles. In general, an attempt was made to address types of vendors not extensively covered previously, or those whose market segment is in particular turmoil, such as aerospace companies. The total list of companies (by type) is contained in Exhibit I-6.

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EXHIBIT I-6

1992 Vendor Survey Participants by Class

Class	Survey Respondents
Equipment Manufacturers (8)	Bull HN, Control Data, DEC, IBM, NCR, Unisys**
Communications Companies (4)	Ameritech, AT&T, Cincinnati Bell*, GTE*, NYNEX
Professional Services Companies	
Consulting-Based Companies(4)	Andersen Consulting**, Coopers & Lybrand, KPMG, Price Waterhouse
IS Professional Services (9)	AMS, BDM*, Computer Sciences (CSC)**, Computer Task Group (CTG)**, PRC, Science Applications Intl. (SAIC)**, SHL Systemhouse, STM, Technology Solutions Company (TSC)*
Systems Operations (3)	Boeing Computer Services, EDS, Litton Computer Services (LCS)**
Aerospace Companies (6)	Grumman**, Hughes/GM*, Lockheed*, Martin Marietta*, McDonnell Douglas, TRW*

*New (first time) profile in 1992.

**Profile updated from prior year.

An analysis of each vendor was produced based on those interviews, materials received from vendors (e.g., promotional literature and quarterly and annual reports), and materials collected independently by INPUT and maintained in individual vendor files. The intent of each profile is to provide a picture of the vendor's general business characteristics and its specific approach to the systems integration market.

Vendor profiles are collected in Chapter IV.

Profiles were released as they were developed prior to the publication of this report. Additional profiles will be released in the future as part of INPUT's Systems Integration Program.

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In addition to the profiles, the information gathered in surveys was combined and analyzed to identify trends and issues relevant to the competitive market. This information was combined with INPUT's buyer/user data to more sharply define the significant factors driving the systems integration market and, specifically, the vendors that service it.

C
Report Structure

The balance of this report is organized as follows:

Chapter II is an Executive Summary, outlining and highlighting findings and conclusions.

Chapter III goes into the details of SI vendor Competitive Structure. It is in this chapter that INPUT provides an analysis of the overall systems integration market today and how it appears to be evolving. Also included is an analysis of how SI vendors are responding to buyer/user initiatives.

Chapter IV provides a Comparative Analysis of SI vendor strategies, organization, capabilities, offerings, and likely directions.

Chapter V provides individual profiles of 33 SI vendors. Fifteen of these profiles are either new or updated in 1992.

Appendix A contains the vendor questionnaire used to obtain the primary research information used in the report.

D
Related INPUT Reports

Recent INPUT reports relevant to the systems integration market include:

- *Systems Integration Trends and Forecasts, 1992-1997*
- *U.S. CIM Systems Integration Market, 1990-1995*
- *Network Integration—A Growing Market*
- *Program Management in Systems Integration*
- *Federal Systems Integration Markets, 1992-1997*
- *Outsourcing Market Opportunities, 1992-1997*

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II

Executive Overview

While this report focuses on vendor competition in the systems integration market, more attention this year must be paid to the changing nature of the SI market itself. Ten years ago, when INPUT began analyzing systems integration as a part of professional services, there might have been some question about SI being a distinct and separate market. That issue, however, has long since been laid to rest by virtue of the sheer size of the SI market (over $9 billion in 1992).

It is also apparent that a combination of rapidly evolving technology and equally rapid political and overall economic change has come together over the last two years. This has clearly had a substantial impact on the industry. The very definitions of the various market segments are in a flux.

The objective of this report is to identify these trends and issues, with the specific goal of assessing how they will impact the positions and strategies of SI vendors over the next five years. INPUT will present a current and accurate analysis of the key strategies and major players in the industry. The emergence of secondary systems integration vendors will also be addressed as a reflection of the changes taking place in the SI market.

A
Background

As previously mentioned, INPUT first identified systems integration as a distinct IS delivery mode over ten years ago. Even at that time it was apparent that SI represented a potentially enormous market. In 1992, even with its numerous problems, SI was the leading growth segment of the industry.

In 1987, INPUT stopped categorizing SI as a segment of professional services and began tracking and forecasting revenues for SI in aggregate and across major industries. That process has continued annually ever since.

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For 1992 INPUT has modified its reporting procedures somewhat, adjusting to the changes and/or evolution of the market as follows:

- "Equipment Services" is now included as a ninth mode of delivery in INPUT's chart of the "Information Services Industry Structure" (Exhibit I-1).
- The industry list against which INPUT tracks SI revenues has been modified. "Miscellaneous Industries" has been eliminated and "Discrete Manufacturing" and "Process Manufacturing" have been combined into the single category of "Manufacturing," reducing the industry list from fifteen to thirteen.
- While INPUT continues to survey and track vendor company organizational structure, less space will be devoted to describing the results, which were consistent with those reported in 1991.
- Like every good study, the results of INPUT's 1992 *U.S. Systems Integration Vendor Analysis* raised as many questions as it answered. It was clear that a more finely honed set of questions will be necessary to *quantitatively* assess vendor market views. Hence, INPUT has drawn significantly on and extrapolated from market data acquired in its *Systems Integration Trends and Forecast, 1992-1997* to help address these issues.

A reading of the individual vendor profiles, particularly those conducted in 1992, will be particularly useful in driving home the point. While some seem to have a clear goal in sight, others are still trying to "find their footing."

B
Trends and Issues

1. Market Overview

Despite a recessionary economy and an anemic recovery in 1992, the $10 billion increase in the information services industry ranks it as a relatively strong sector in general, and the fastest growing part of the computer business. The industry will continue on a slower growth path in the 1990s than it experienced in the 1980s, but will exceed the $200 billion mark by 1997, with a steady $20 to $25 billion increase annually. As illustrated in Exhibit II-1, systems integration will increase as a percentage of IS volume from approximately 7.5% in 1992 to about 10% in 1997.

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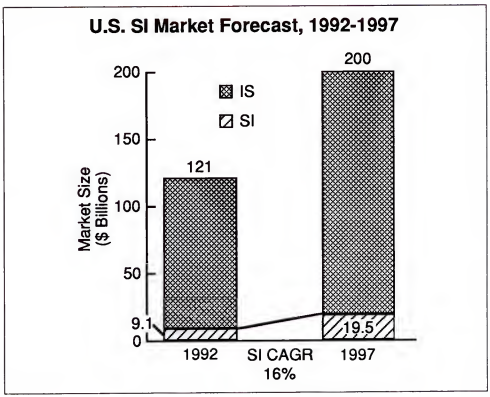
EXHIBIT II-1



INPUT's definition of a systems integrator is shown in Exhibit II-2. It emphasizes that a vendor be capable of supplying a complete solution to complex requirements involving the custom selection and implementation of products and services.

EXHIBIT II-2

SI Vendor Capability Definition

- Business/information consulting
- Complete solution to complex technical requirements
  - Mainframe, minicomputer and PC sources
  - Applications software
  - Telecommunications
  - Networking
  - Data communications
- Background in specific industries
- Project management capability
- Financial ability to assume risk

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The systems integrator typically has project management responsibility—the overall management for delivery of the end product—which typically includes equipment, software, and communications. The integrator also coordinates teaming arrangements with outside suppliers for engineering, data processing, and personnel resources and the documentation, training, and post-implementation support required by the client.

The vendors' responsibility includes financial risk for the success of the system. As part of the contract, the SI vendor gives a warranty for success. This essentially guarantees that the system will be delivered as promised, will operate according to contractual specifications, and will come in at the agreed-upon cost.

In general, systems integration projects involve complex, multidisciplinary information systems with the following characteristics:

- Projects are usually multiyear.
- Project management demands are significant.
- Target systems are usually strategically significant to the client's organization.
- The system typically requires custom software and may include a large network and/or communications requirement.

The federal market has been and continues to be the largest individual market for SI. Despite its slowing growth rate and diminished profitability, it is a large, established market which will continue to be attractive over the next five years. However, the higher growth rate and profitability, combined with the ultimate size of the commercial market (see Exhibit II-3) will increasingly attract systems integrators who previously concentrated exclusively on the federal sector.

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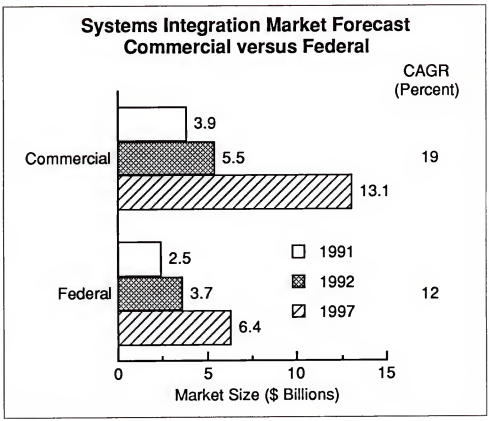
EXHIBIT II-3



On a worldwide basis, the information services industry continues to experience growth rates of close to 20%. Many U.S. vendors are experiencing growth overseas that exceeds the U.S. industry as a whole. In turn, some international vendors are penetrating the U.S. market.

Although the economic recession was the principal factor causing the drop in the rate of growth for systems integration and other information services during the past two years, it did not have an equal impact on the use of systems integration in various markets or on the vendors offering these services.

The market for systems integration is more sensitive to economic conditions than has previously been the case. Budgets for information systems are growing more slowly and a small percentage actually show a decrease. Companies that are able to invest in information technology during slow economic times will be best positioned to grow their business when the recovery accelerates. Virtually no one argues about the relationship between competitiveness and productivity. Information technology is the key to productivity.

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2. Buyer/User Issues

Users are increasingly becoming buyers. As illustrated in Exhibit II-4, the resulting change in focus is changing the nature of the SI market.

EXHIBIT II-4

Major Buyer/User Issues

- Competitive demands force core business focus
- Internal control versus inadequate skills
- Users become buyers
- Increasingly complex technology demands
- Full service/liability demands on SI vendors
- Smaller projects, faster results

Two factors are driving this phenomenon. Firstly, IS managers initially ignored microcomputers and workstations as they penetrated middle management ranks. As the technology matured, so did the users, who now increasingly occupy upper middle and senior management positions.

Secondly, domestic and international competition have forced management to concentrate on its core business. More is demanded from information, at less cost. "Leading edge" technology is suspect unless it can be demonstrated that it supports a company's strategic objectives in the most tangible terms, e.g., producing higher quality products at lower cost, shortening response time, or improving market data gathering.

There is also a demand for more modular projects which can be implemented more rapidly and at lower cost. Manufacturing is hard pressed to consider large, complicated, "total" solutions. They demand modularized systems, arranged in less ambitious, more affordable packages. Many users are reacting to prior applications that left them "data swamped" but "information poor."

To take advantage of the most specific and cost-effective technologies in any given area, users are (and have been) downsizing. In many cases, downsizing simply spreads pre-existing process problems to a host of smaller machines or creates a host of new problems.

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Re-engineering then becomes necessary, which in large part is the reason that the IS/SI industry has been re-invigorated. On the other hand, the demand for the integration of a variety of platforms and operating systems, tied into existing mainframes, capable of operating on a twenty-four-hour basis, internationally, creates an integration and networking problem demanding the very leading edge technology that arouses management suspicion in the first place.

The demand for short-term, small projects and fast payback is also putting a strain on infrastructure maintenance and enhancement projects. In some sectors the problem is so pronounced that at least one professional services firm is openly advocating that IS managers "bury" infrastructure costs in a variety of short-term projects, with the assurance that they will emerge as "heroes" in the future.

The greater user awareness of SI potential is also increasing the demand on vendors for full service/complete solution capability. The issue of liability is no doubt driving the phenomenon.

At the same time, two factors in user organizations serve to challenge even that basic requirement. First, as user sophistication increases, so too does the demand for buying power, both on a functional and divisional/departmental level. Second, mergers and acquisitions create their own problems of supplier preference and multiple platforms.

3. Vendor Issues

The 1991-1992 period has been one of challenge for systems integration vendors which will be rivaled by the next five years. While industry growth is inevitable, it will certainly not be as strong or as predictable as that of the 1980s.

Financial commitment, accompanied by liability factors, looms larger than ever, in terms of both corporate investment/return issues and project management exposure. In fact, the review of vendor issues in Exhibit II-5 can essentially be summed up in a word: risk.

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EXHIBIT II-5

Major Vendor Issues

- Increasing competition
- Full service buyer demands
- Technology and personnel investments
- Alliances and mergers
- Secondary vendor relationships
- Reduced project size
- New marketing demands

With cutbacks in defense, vendors specializing in this sector are eyeing civilian agencies for new markets. Vendors comfortably established in the federal civilian sector are moving into state, county, and local projects. Both are exploring the private sector for new business prospects.

Outsourcing vendors are responding to buyer demands for "full service." In the process they are redefining the term and blurring the distinction between outsourcing and SI.

Common wisdom suggests that front-end business consulting and back-end processing provide a route to capturing a client throughout the entire development and operations cycle. There is certainly an advantage to the firm that both writes the specifications for a project and then offers the capability to fulfill the requirements.

Technology issues are driving an increasing dependence on secondary vendors, particularly in the area of integration, networking, and communications. In many cases, SI vendors are prone to forget that the primary orientation of such vendors is the sale of a product. While they might desire to provide the high level of support demanded by an SI client, they are frequently not equipped to do so.

The trend toward smaller projects in larger companies will no doubt drive vendors into a search for additional markets among medium-sized companies, a choice which they might not have considered three or four years ago. This will force SI vendors into a new business prospecting mode with which many will be unfamiliar. How the marketing elements of advertising, promotion, and public relations fit into that mix will represent a new learning experience for many SI vendors.

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C
Primary Findings

1. Competitive Structure

Exhibit II-6 provides an overview of the top five SI vendors in 1991, covering both the commercial and federal sectors. What is interesting to note is the total share of the market these vendors represent. In 1990, the top ten vendors accounted for 79% of the market. One year later, the share of the top ten was only 66%.

EXHIBIT II-6

U.S. Systems Integration Vendor Market Share, 1991

Vendor	Percent
1. IBM	17
2. Andersen Consulting(1,2)	8
3. EDS	8
4. Digital	6
5. Computer Sciences Corporation(2)	5

(1) Includes INPUT's estimate of equipment content

(2) Adjusted to calendar year 1991

Competition is becoming fierce in an industry that five years ago was considered fledgling. INPUT now counts 39 companies with SI business in excess of $50 million in 1991. Foreign competition is also on the rise with entrants such as Cap Gemini Sogeti and SAP.

IBM was the leader in both the commercial and government sectors in 1991. It formed Integrated Systems Solutions Corporation (ISSC), primarily to focus on outsourcing. But IBM has already begun to shift its Technology Centers to ISSC control and has indicated a restructuring of its sales organization to allow for far greater autonomy and an announced vertical market focus. As has already been pointed out, outsourcing vendors are now taking on entire technology infrastructures, redefining and blurring previous boundaries.

Andersen Consulting continues to demonstrate dramatic growth in the SI market, moving from third overall in 1989 to second in 1991. It has done so almost exclusively in the commercial sector.

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EDS, while a leader in processing services, is taking full advantage of its manufacturing and telecommunications resource in its parent company, General Motors. Systems integration will serve to protect existing processing accounts and aid the firm in developing new ones.

Exhibit II-7 shows the top five SI vendors in the commercial sector.

EXHIBIT II-7

U.S. Commercial Systems Integration Vendor Market Share, 1991

Vendor	Percent
1. IBM	18
2. Andersen Consulting	17
3. Digital	10
4. EDS	7
5. TRW	5

Digital's ranking has increased substantially over the past few years, replacing Unisys in the top-five vendor ranking. While the firm is no doubt protecting its equipment business in its long-held position in the manufacturing sector, Digital is clearly moving toward open systems, starting with its announced intention of cleaning up its own product lines.

A very large question is how the major players in the federal market are going to move, particularly those heavily committed to a shrinking defense market. Exhibit II-8 shows the top five SI vendors in the federal sector.

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EXHIBIT II-8

U.S. Federal Systems Integration Vendor Market Share, 1991

Vendor	Percent
1. IBM	16
2. EDS	9
3. SAIC	8
4. Martin Marietta	8
5. Computer Sciences Corp.	7

Many vendors have attempted to take their strong technical resources and apply them to civilian and commercial applications. Image processing is a popular area, but already highly competitive. It is also a fairly difficult sale in a weak economy, outside of companies and agencies with highly specialized and specific requirements.

All of these companies have learned to operate in the unique market that is the federal government. In general, they do not transfer well to the private sector and, given the continuing lure of large federal contracts, it has yet to be seen how many of the major federal players will be able to make the transition.

2. Secondary SI Vendors

Secondary SI vendors have made significant inroads into the IS market over the last year. SI technology drivers such as relational data bases, networking/connectivity, distributed systems, client/server architecture, and the general demand for open systems have increased the technical complexity of typical SI projects and opened the door to specialists who can solve problems for mainstream SI vendors.

As Exhibit II-9 illustrates, secondary vendors have much to offer on a technical level and are too weak financially to offer much of a marketing threat. Aside from the obvious limitations listed, the downside of such a relationship is certainly manageable.

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EXHIBIT II-9

Secondary SI Vendors

Perceptions

- High interest level in SI—a new market
- Generally do not want to be prime contractor
- SI--a growing part of their business
- Know who major players are
- Want visibility to major players for specific capabilities

Limitations

- Experience base often limited
- No large project management experience
- Narrow (highly specialized) technical skills
- Lack of financial resources
- If software or turnkey, restricted to own solution
- Geographically limited

On the other hand, the ongoing proviso remains regarding the inherent danger of alliances. While a secondary vendor is not in a position to directly challenge a mainstream SI vendor, the freedom to ally itself with another vendor that can is certainly a very real possibility.

Another real problem lies in the different interests of the SI vendor versus the secondary vendor. The former expects to earn significant profits from professional services. The latter, depending on the application, frequently earns its revenues from the sale of hardware or software, where margins are not always great enough for the secondary vendor to provide the level of support that might be required.

Such relationships are inevitable and potentially mutually beneficial. However, as much care must be taken to pre-define the relationship and obligations as is done with the client.

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D
Conclusions and Recommendations

Successful SI vendors are going to be dealing, for the most part, in unfamiliar territory over the next few years: the world of marketing and promotion. This world is comprised of the rough and tumble world of the advertising, not the subtle world of client references, promotional seminars, and the occasional fling at "corporate advertising". Thus, focused advertising, aggressive public relations campaigns and management trade show marketing all will encompass this rough world of marketing promotion.

That's why the first recommendation in Exhibit II-10 is to develop the skills necessary to direct such activity. It will be expensive and, without proper market positioning, potentially useless, if not damaging.

EXHIBIT II-10

Recommendations

- Analytical/promotional marketing skills development
- Develop industry-focused market strategies
- Present full service image
- Leverage unique capabilities and products
- Establish strategic partnerships (alliances)
- Manage risk
- Proprietary products and methodologies

Emerging from such an effort should be the development of an industry-focused market strategy. If the strategy developed makes sense, the SI vendor should be able to project a full service image, leveraging the firm's unique abilities and products.

Only the largest of system integrators can legitimately define themselves as full-service vendors across broad industry lines. For most, care must be taken to select vertical markets which they can legitimately claim as their own.

Even then, they need to manage risk. There will inevitably be some stretching in the establishment of credentials. A formal alliance program can do much to help in this area, shoring up company weaknesses with other SI vendors and/or secondary vendors that offer complimentary skills.

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Proprietary methodologies and products can do well in the marketing mix. But care must be taken to avoid a dogmatic appearance, particularly in the commercial sector, and particularly with regard to product where open systems are viewed as ultimately desirable.

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III

Competitive Structure

The systems integration market is a reflection of the international economy as a whole. The industry is being profoundly affected by rapid advances in technology, combined with dramatic and equally rapid political and economic changes resulting from the demise of the Soviet Union.

Five years ago SI was a new industry, the existence of which as a truly identifiable, viable market entity was being seriously questioned. Many perceived it as merely a method for companies in the various sectors of the IS industry to bolster core business.

Today, discussions concerning SI frequently revolve around the issue of its "maturation" as a distinct sector. Some continue to question its viability, citing the impact of restructuring, downsizing, re-engineering, and outsourcing as fundamentally changing delivery modes in the IS industry, profoundly affecting SI to the point of extinction.

While there is no doubt that the SI market has been fundamentally and irrevocably changed over the last two to three years, it should also be mentioned that, despite a host of economic pressures, SI has fared rather well over the 1990-1992 recessionary period, both when compared to the IS marketplace and the overall computer industry, and especially in comparison to the other markets in the overall economy.

The SI industry has *grown* during the recession, albeit slower than in the previous decade. Profits have been squeezed. Individual companies and sectors have been hurt more than others, but overall the industry is strong.

SI vendors must simply adjust to the fact that they are no longer immune to overall market shifts and pressures. What once was an isolated marketplace, with a unique and highly predictable competitive profile, has now truly become an integrated part of the global economy.

In this section, INPUT will attempt to define the nature of the marketplace for SI products and services, primarily by concentrating on the needs of the user/buyers. In the next section, attention will be paid to how vendors are responding to the market and what changes will be required to respond more effectively.

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SI vendor uncertainty is this area is apparent. While it is a common concern in the overall marketplace, it is a relatively new phenomenon in the SI industry.

A
Market Overview

1. General Characteristics

General SI market factors seem to have stabilized in 1992. The largest growth over the next five years is clearly going to be in the commercial sector. Despite an overall decrease in total plant and equipment spending in 1991 (1%) and an anemic increase in 1992 (4%), SI continues to outperform overall spending by a significant factor (though industry growth has slowed overall from the 1980s). An improved economy will see pent-up demand drive the commercial sector to a compound annual growth rate of 19% between 1992 and 1997.

The federal government continues to invest in data processing and communications products and services. While increased budget deficits will no doubt drive Congress to impose some kind of fiscal restraints over the next five years, the need for productivity should balance such restrictions in the SI area and result in a 12% compound annual growth rate in overall federal SI spending from 1992 to 1997.

As illustrated in Exhibit III-1, with the lag in federal spending, the overall compound annual growth rate for the systems integration industry will be approximately 16%. While nowhere near the rates experienced in the 1980s, such growth still looks good in comparison to many other industries and projections for the overall economy.

Although profitability figures are the most difficult to obtain from vendors, profits in the federal sector have been reported and/or assessed as stable to decreasing. In the commercial sector profitability would appear to be stable to increasing.

Wide discrepancies in profitability have been noted between vendors, even when limiting the assessment within either the federal or commercial SI sectors. It would appear that individual firms are reflecting the degree of success with which they have been able to adjust to changing market factors.

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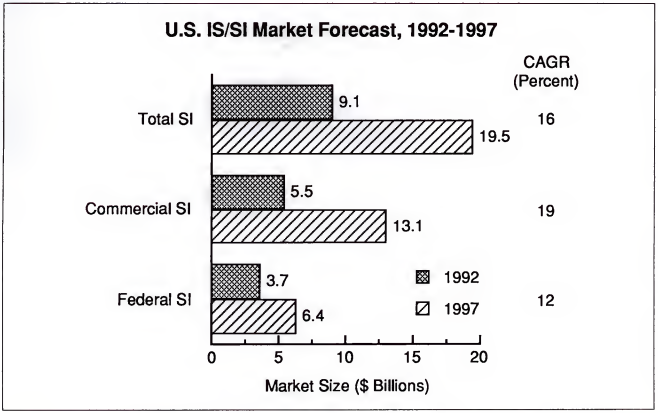
EXHIBIT III-1



2. Federal versus Commercial Market

Anticipating a significant decline in defense spending, many vendors concentrating in this sector have been shifting. Noting the slowdown in federal SI growth, many federal contractors are attempting to shift some part of their marketing effort to the federal civilian sector and/or the commercial SI market.

While growth in the federal civilian sector is projected to exceed DoD spending, Exhibit III-2 shows that the difference in compound growth through 1997 (11% versus 12%) will not be sufficient to absorb the number of competitors from the defense sector seeking civilian projects.

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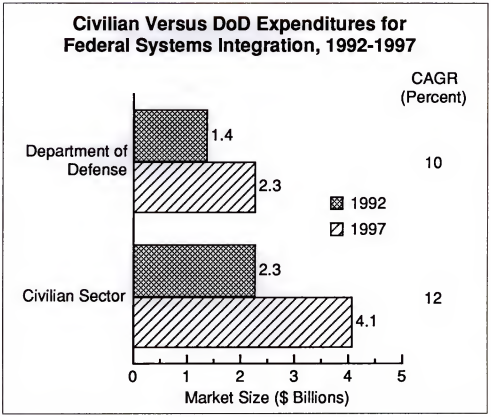
EXHIBIT III-2



Vendors previously concentrating on federal projects who seek to enter the commercial sector will find even more significant problems. Exhibit III-3 illustrates the differences in project characteristics between the federal and commercial sectors. Clearly, the marketing/sales area will represent a major change for vendors seeking to make a transition.

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EXHIBIT III-3

Commercial Versus Federal Systems Integration Characteristics

Characteristics	Commercial	Federal
Customers		
Requirements knowledge	Low	High
Technical knowledge	Variable	High
Interface	Multiple	Single
Vendors		
Vertical expertise	Preferred	Mandatory
Customer base	Leverageable	Reference
Business knowledge	Required	Optional
Reputation	Media-based	Historic
Business conditions		
Lead generation	Field sales	Commerce
	Advertising	Business daily
	Trade shows	Federal budgets
Competitive bids	Optional	Required
Bid complexity	Variable	High
Expenditure commitment	Deferrable	Uncertain
Risk exposure	High	Contained
Contract type	Fixed price	Mostly fixed
Price restriction	Competitive	Ceilings
Bonuses	Occasionally	Award/incentive
Penalties	Occasionally	Exception
Profit potential	High	Limited %/high $
Time to award	Business-driven	Procurement process

Then there are significant differences in the proportion of products and services required by the two sectors and the areas in which revenues are generated. Exhibit III-4 provides an outline of products and services in systems integration projects.

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EXHIBIT III-4

Products and Services in Systems Integration Programs

Equipment
- Information systems
- Communications

Software Products
- Systems software
- Applications software

Professional Services
- Consulting
  - Feasibility and trade-off studies
  - Selection of equipment, networks, and software
- Program/project management
- Design/integration
  - Systems design
  - Installation of equipment, network, and software
  - Demonstration and testing
- Software development
  - Modification of software packages
  - Modification of existing software
  - Custom development of software
- Education/training and documentation
- Systems operations/maintenance

Other Miscellaneous Products/Services
- Site preparation
- Data processing supplies
- Processing/network services
- Data/voice communication services

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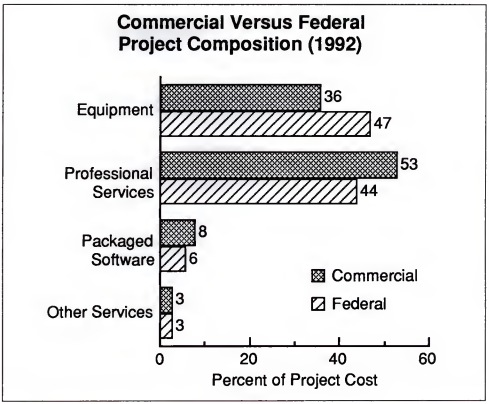
Exhibit III-5 elaborates on the differences in financial characteristics between the federal and commercial sectors, with regards to these items.

EXHIBIT III-5



Many of the vendors seeking to move from federal to commercial projects have recognized the differences and developed separate groups to address the two markets. Their approach until now appears to be one of leveraging advanced technologies developed through their federal government contract experience as an entrance into the commercial sector. Image processing has become a very popular focal point for many.

They face two problems in this effort. First, advanced technology has lost its appeal with many in the commercial sector. There is generally a low receptivity among buyers toward "experimentation." They want "tried and true" solutions that will have an immediate impact on specific business problems. Sophisticated, leading-edge image processing technologies have proven an especially hard sell in such a climate.

Second, commercial marketing groups in companies focused on the federal sector have frequently found themselves "orphaned" when the lure of a major, looming federal contract distracts senior management and the support they bring with them. The fact is that the federal government continues to offer significant contract opportunities in both the DoD and civilian sectors. For many federal vendors, it would probably be wise to adjust to the intensified competition in that sector rather than expend significant resources in the commercial area. Those that do intend to

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make the transition should be prepared for a lengthy and uneven period of market development. This topic is addressed further in Chapter IV.

B
Market Factors and Projections

Despite many well publicized (and some not-so-well publicized) efforts, the SI market picture looks pretty much the same going into 1993 as it did in 1992. The federal sector is increasingly competitive but remains lucrative for those firms accustomed to working in that environment.

1. Federal versus Commercial Projections

Large-scale federal contracts continue to be available and will be so into the foreseeable future. DoD has launched a major push for a corporate information management system (CIM) which should provide system integrators with many opportunities over the long term.

Civilian federal agency system integration project spending will reach $4.2 billion by 1997. Many DoD vendors are eyeing a number of large, multi-year civil systems being implemented for the FAA, IRS, Military Reserve System, and Social Security System. Competition will be fierce and the usual vendor award protests will undoubtedly delay start dates.

As illustrated in Exhibit III-6, state and local government project spending will grow at a compound annual rate of 21%, reaching $2.4 billion in spending by 1997, to equal the budget of DoD. Though INPUT classifies state and local government projects in its commercial forecast, this sector has enough in common with the federal sector to attract vendors seeking to make a smooth transition. In fact, some vendors have opted to work in state-funded manufacturing demonstration projects as an entrance to manufacturing sector business.

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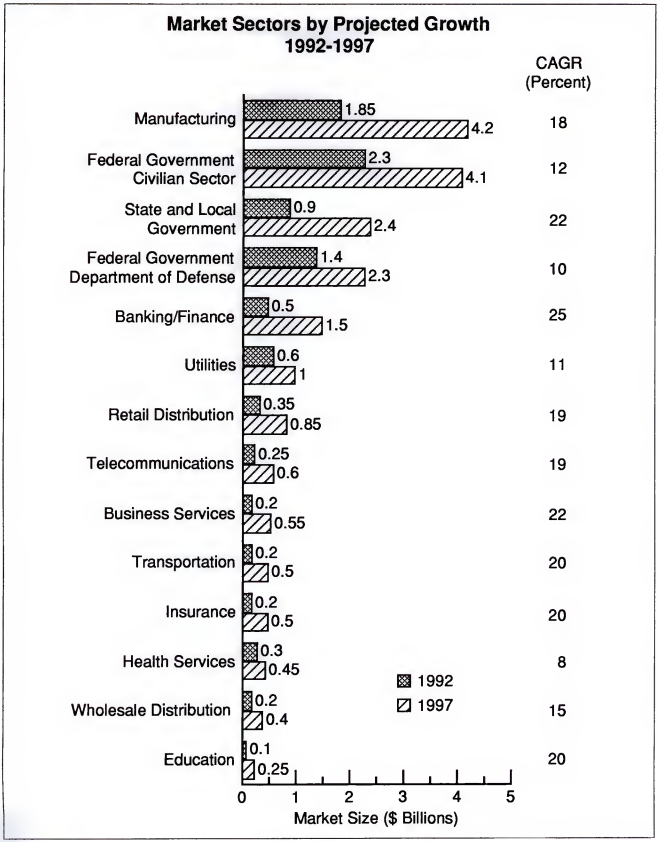
EXHIBIT III-6



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The commercial sector has clearly embraced SI. After just a few years of acceptance of the SI concept, commercial systems integration budgets will easily exceed federal spending over the next five years and so represent the most significant market opportunity. Profits in the commercial sector are higher than in federal projects, but as has already been pointed out, major differences in project characteristics pose a problem for federal project vendor specialists seeking to move onto the commercial side.

Commercial projects in general have always been smaller than federal projects. They are getting smaller still, as business seeks to reduce spending and realize a return on investment (ROI) faster. This factor increasingly opens the market to smaller vendors, making the commercial market even more competitive than the federal.

2. Key Commercial Factors

The positive and negative factors influencing the commercial systems integration market are outlined in Exhibit III-7. INPUT does not see the negative factors as significant enough to seriously slow market growth over the next decade.

EXHIBIT III-7

Key Commercial SI Market Factors

Positive
- Downsizing/re-engineering
- Rising demand for connectivity
- Major rebuilding of infrastructure
- Growing user/client involvement
- Computer literacy
- Global competitive pressures
- Growing complexity of applications

Negative
- In-house competitive threat
- Poor economy
- System maintenance concerns
- Capital availability
- Organizational instability

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Capital shortages and concerns over an anemic economic recovery are factors that can change rapidly. These are short-term factors. In fact, the backlog created by delayed projects will no doubt prove a boon to long-term prospects.

Organizational instability can serve to delay projects in the short term, but again should create a project backlog that will fuel growth in the long term. Further, mergers and acquisitions may actually serve to spur further growth, given the need to combine various platforms and operating systems in the aftermath of such activity.

The concerns about maintaining software programs developed by others is diminishing, as years of professional services experience and proven documentation techniques override them. Further, the steady increase in outsourcing and the blurring of the line between outsourcing and systems integration vendors will mean that the SI vendor will increasingly offer the outsourcing option in response to this concern.

The increasing sophistication of projects and diversity of skills required works against an in-house competitive threat. On the other hand, smaller projects may be viewed as more manageable, leaving this factor as something of a challenge, particularly when the maintenance of system control is favored over the outsourcing option.

On the positive side, downsizing, re-engineering, a rising demand for connectivity, and the consequent growing complexity of even small-scale projects work against in-house staff having the technical capability to deal with all the issues involved. Though an in-house staff can certainly act as a "contractor" on a project, hiring skills as necessary, the responsibility issue generally looms large enough to frighten off all but the boldest of IS managers. This issue will be discussed further in the next section.

Global competition is forcing business to think in terms of real-time mode, operating on a twenty-four hour basis, around the world. Information requirements no longer just pertain to product design and manufacturing but have finally reached the level of distribution and instantaneous customer feedback.

All of this is going to require a major rebuilding of infrastructure. On the one hand, the commercial sector is reluctant to make such a long-term investment. On the other hand, a growing computer literacy creates an appreciation for the value of such investment and competitive demands are likely to insure that they are made, sooner or later.

3. Key Federal Factors

As previously described, for all of the talk of budget cutting and "peace dividends," there are numerous influences that continue to make federal systems integration a highly desirable market. As increased reporting

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requirements strain antiquated government systems, systems integrators will be in demand to redesign systems that once would simply have been replaced with more capacity. The kinds of problems and opportunities they will face are listed in Exhibit III-8.

EXHIBIT III-8

Key Federal SI Market Factors

Positive
- Productivity improvement demand
- Shortage of technical staff
- Trend toward technology upgrades
- Accountability
- Software integration
- Commercialization

Mixed Impacts
- Deficit and budgets
- Changing priorities
- More hardware/less professional services
- Fewer "mega"-contracts

Negative
- Extended implementation schedules
- Corporate information management initiative
- System maintenance
- Adversarial posture

General Services Administration (GSA) has argued that the larger an SI project becomes, the more unmanageable it is. Yet "mega"-contracts continue to be awarded because the concept of single vendor responsibility has proven as attractive to government as it is becoming to private industry. However, there is certainly a chance that, in view of GSA concern, some agencies will compromise with an overall "grand design" which will be implemented with a modular approach, dampening federal growth rates.

Budget constraints and the sudden changes in international political and economic circumstances will no doubt drive some delays in SI projects. But a still greater cause of delay will likely be the protests registered by losing bidders, particularly on major projects.

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Overall, however, new hardware technologies and the next generation of software will be necessary if government is to meet the reporting role demanded of it. The demand for communication between incompatible equipment is a fact of life and agencies are increasingly required to merge large applications into a single, transparent system that fits users' needs. The market for SI services is simply not going to go away.

C
Buyer Issues/Vendor Challenges

Chief Information Officers are increasingly losing budgetary control and even planning control over new systems. They are being assigned the role of designing the infrastructure and managing the technology investment, while users define their project needs and the source of supply to satisfy them. The CIO may well act as a consultant, but final spending authority will increasingly rest with the user.

SI vendors must keep this shift in mind if they expect to be successful in this brave new world.

1. Buyer Issues

There is a great deal of value in repeating the chart contained in the previous chapter relating to major buyer/user issues (see Exhibit III-9). It must be kept in mind however, that concerns will vary dramatically from sector to sector, as well as within each sector.

EXHIBIT III-9

Major Buyer/User Issues

- Competitive demands force core business focus
- Internal control versus inadequate skills
- Users become buyers
- Increasingly complex technology demands
- Full service/liability demands on SI vendors
- Smaller projects, faster results

While all of the factors listed will likely be of concern to one degree or another, emphasis can differ markedly not only from company to company, but from division to division, and even from department to department within a given company. The shift from a centralized CIO buyer to a multitude of users presents a good many challenges and an equally large number of opportunities.

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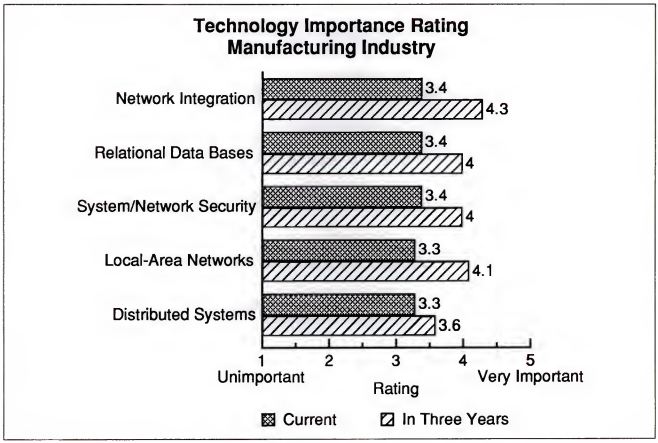
It is undoubtedly this dilution of buying authority which is driving an increased demand for business and process consulting from SI vendors. There is an increasing need to define the "what" before the "how."

Users may be more technically sophisticated than in the past, but that does not make them the equivalent of a CIO. Consequently, there will typically be a number of contradictions to be resolved for vendors.

For instance, Exhibit III-10 is a manufacturer's response to an INPUT survey asking for a rating of technology in its industry. The contradictions are both interesting and revealing.

EXHIBIT III-10



The most obvious factor is the increasing importance of network integration over a three-year period. However, given the *immediate* focus of buyers, where does the SI vendor place emphasis?

Distributed systems are given a rather modest importance rating. Yet distributed systems have been an integral part of manufacturing process control for the past twenty years!

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The caution for vendors in this rather basic example is the problem of identifying what buyers think they need versus what their requirements list actually indicates they need. The reconciliation of the two lists is an interesting process.

The other major factor of concern to SI vendors is the requirements of buyers driving sophisticated technology solutions versus their suspicion of the very technology they may require.

A case in point is network protocol for linking disparate systems. In the main, customers are demonstrating a marked preference for the older TCP/IP (Transaction Control Protocol/Internet Protocol) over the newer OSI (Open Systems Interconnection) that promises an international standard for linking different types of computers and networks to a mainframe host.

"Open standards" may be in fashion, but its a classic "chicken or egg" problem. Users want to know that there are many successful OSI applications out there before they commit.

Vendors are likely to find many such contradictions as they increasingly deal with user/buyers.

2. Vendor Challenges

A more detailed description of vendor marketing and project management issues will be presented in Chapter IV. But the issues are pressing enough that a preview of marketing concerns is worthwhile. Exhibit III-11 outlines some of the considerations that vendors face, at least in the commercial sector, as users increasingly become buyers.

EXHIBIT III-11

Vendor Challenges Prospecting and Selling

- Identification of prospects
- Identification of multiple buying influences
- Unifying disparate requirements
- Proposal/bid preparation addressing these multiple elements and varying levels of sophistication

Unlike the federal process, locating potential projects, particularly as they become smaller, will represent a significant task for SI vendors. In many cases, prospects will not even be aware that they require SI vendors. Their initial starting point may well be hardware vendors or software suppliers with whom they are already dealing.

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Advertising, as well as trade shows, must both become a more significant factor for SI vendors. The approach must be one that manufacturers have used for years: an educational approach which clearly positions the SI vendor in the minds of prospects.

Once identified, SI vendors are going to have to be aware of multiple and often disparate buying influences, with varying degrees of technical sophistication. Those various elements will have to be addressed throughout the selling process, right through to the formal submission of the proposal.

The process can be very expensive, requiring significant amounts of time on the part of highly paid personnel. Hence, vendors are going to have to develop routine approaches that contain selling costs in anticipation of the problem.

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IV

Vendor Profiles

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COMPANY PROFILE

AT&T

1. Key SI Contacts

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Morristown, NJ 07962

Mr. Ed Kozemchak
Director - Customer Application Engineering and Training
AT&T
580 Howard Avenue, Room 4A423
Somerset, NJ 08873

2. Description of Principal Business

AT&T is the leading domestic provider of telecommunications services and equipment. In 1989, AT&T's total revenues reached $36.1 billion. AT&T operates the largest switched long-distance voice network and manufactures and distributes telephone switching equipment. In addition, AT&T sells and leases voice and data business equipment. AT&T provides a wide variety of international network services.

AT&T provides a wide variety of international network services, including network services to foreign governments and national organizations. In its traditional lines of business, AT&T has superior technical capability and provides services to virtually all vertical markets. The corporation has long been known as a leader in basic research.

3. Competitive Position

As a communications company, AT&T is still the largest seller of switched telecommunications services, with more than half of the domestic market. AT&T is still the strongest provider of national communications services, but faces growing competition from two sources: independent services providers such as Sprint and MCI, and companies such as Sears and some of the larger hotel/motel chains, which are implementing national networks primarily for their own use but are including spare capacity for growth and for resale. AT&T remains the major supplier of central office switching equipment, but is experiencing increasing competition from companies such as General Telephone, Northern Telecom, and Fujitsu. Since divestiture, AT&T has lost market shares of the end-user equipment market to the Bell Operating Companies and the third-party (largely foreign) market. It has become much more aggressive in marketing and pricing its products over the last year.

Any competitive weaknesses that AT&T may have can be directly related to two significant factors:

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- First, the traditional services that AT&T provides are subject to regulatory approval by the Federal Communications Commission (FCC). This gives competitors advance knowledge of service offerings and pricing, as well as the right to object to any provisions that they believe to be anticompetitive.

- Also, AT&T has to do battle with its own internal bureaucracy—a legacy of its monopolistic days. It takes great effort on AT&T's part to be responsive to changing opportunities and markets. This reduces AT&T's ability to consistently focus its efforts to achieve its strategic goals.

AT&T has been providing integrated systems to the federal SI market for over 20 years, and network integration to the commercial market for more than ten years. AT&T entered into the computer systems integration market approximately four years ago, with separate communications and computer systems integration organizations. Since INPUT's last report in 1988, however, AT&T has distributed its computer systems integration efforts closer to its customers — through regionally deployed Customer Application Engineering Centers. These Centers are coordinated through a National Customer Application Engineering Center in Somerset, New Jersey.

4. Markets Served

In its traditional business, AT&T is a major player in virtually every vertical industry sector. The systems integration activities to date have focused heavily on AT&T's strong functional capability in communications networks.

- AT&T Computer Systems has targeted the following functions and industries:

  - Network computing—making use of AT&T's major expertise in systems connectivity technologies

  - Business orchestration—i.e., workflow automation tools

  - Federal, state, and local governments

  - Telecommunications

  - Lodging, transportation and retail

All these targets show that AT&T is shifting its focus on communications as a necessary adjunct to the life of a viable business organization.

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5. Recent Events

The most important single recent contract won by AT&T is the award of the federal FTS-2000 contract. FTS-2000, a private nationwide federal administrative switched voice communications network will make AT&T a vital supplier of communications facilities and services to the federal government well into the 21st century.

Recent events that happened while this profile of AT&T was being written suggest that AT&T is beginning to more aggressively pursue a more prominent role in the information systems and technology industry: in December, 1990 AT&T made a $6 billion offer for NCR, the nation's fifth-largest computer manufacturer.

6. SI Organization

AT&T's SI organization has shifted from highly centralized with matrixed support to largely decentralized. It is interesting to note that in its operation in the commercial SI market, AT&T operates most functions in both centralized and decentralized styles, with few functions either wholly decentralized or centralized. It has implemented a major change in its SI service by decentralizing its project management and much of its implementation capability. Like IBM, it recognizes the need to get the implementors close to or on the client's site. In the federal SI market, however, AT&T responds to the federal penchant for dealing with a single manager on all issues of consequence. In the federal sector, AT&T can operate in essentially fully centralized style, as shown in Exhibit ATT-1.

EXHIBIT ATT-1

AT&T Business Functions
Centralized or Decentralized

Responsibilities	Commercial	Federal
Strategy, long-range planning	C	C
Marketing & promotion	B	C
Account management, sales	D	C
Contract review & approval	B	C
Project management & control	D	C
Implementation & development	B	C
Hardware/software acquisition	B	C

C = Centralized, D = Decentralized, B = Both

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AT&T currently reports approximately 400 full-time employees dedicated to SI. This is not surprising; AT&T is a relatively new entrant into the separate SI market. Exhibit ATT-2 shows the distribution of AT&T staff across the various SI activities.

EXHIBIT ATT-2

Distribution of SI Personnel—AT&T

Capability	Percent
Management, strategy & planning	10
Legal support/contract administration	5
Project management	10
Systems development/implementation	40
Hardware/software evaluation/acquisition	15
Hardware engineering	10
Sales	10

7. SI Business Objectives

INPUT still believes that AT&T's major SI objectives will be to identify and pursue niche opportunities that make the best use of AT&T's strengths. Particularly, INPUT believes that AT&T will:

- Focus on opportunities that make the best use of its strengths in long-distance network design, implementation, and management
- Place emphasis on alliances related to specific opportunities. As the major provider of long-distance telecommunications services, AT&T is a logical choice as an ally for other vendors to provide the telecommunications component of key contracts.
- Use SI as a means of pulling together and marketing its own services. AT&T will develop strategies that focus on providing services, such as customized telemarketing solutions, that require the combination of computers, custom software, and network services that AT&T already provides.

If, however, AT&T's offer to acquire NCR succeeds, all this will change. AT&T will instantly become a much more major participant in the SI market (as in other parts of the information systems and technology market).

Up to now, AT&T has apparently seen SI as a business opportunity that should improve the profitability of its other lines of business and as a

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means of promoting the sale of its principal products and services. Also, like other hardware and services providers, AT&T has been under increasing pressure from its customer base to respond to requirements for integration services. Finally, INPUT sees the provision of SI services by AT&T as an opportunity for AT&T to differentiate itself from its competitors in its increasingly competitive traditional markets. Combined with NCR, however, AT&T will be in a position to directly influence the computer and telecommunications markets for years to come.

8. SI Capabilities Evaluation

AT&T has exceptionally strong capabilities in areas related to the design, development, and management of large telecommunications networks. In particular, the alliances identified above give AT&T a good mix of hardware and software capabilities that support its pursuit of SI business.

AT&T is working aggressively to establish its strengths in other key areas, such as:

- Business Consulting - AT&T has a strong capability in this area when it comes to network development and management. This capability is definitely marketable in niche areas. It has traditionally used alliances to supplement this skill with general business consulting, but will need to significantly strengthen its own capabilities to compete in the general SI market.

- Design/Integration, Project Management - Again, AT&T has significant capability at the network level, but little in the area of applications systems design or data integration. AT&T has been working to establish alliances that would contribute to the development of this area. Its earlier alliance with EDS, and later with CSC, are examples in this area.

- Software Development - With the exception of its network exchange software, AT&T has little experience in the development of software applications. This is a significant weakness.

- Education, Training, and Documentation - AT&T has strong skills in training and education in telecommunications. AT&T operates a school for all levels of training for telecommunications professionals that is open to the public. In recent years, education and training focusing on UNIX and network computing have broadened the telecommunications offerings.

- Packaged Application Software - Since deregulation, AT&T has been working to develop its customer billing and call accounting systems as packaged products to sell to RBOCs and other carriers; however, this development has not seen great success.

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- Packaged Systems Software - Other than UNIX, AT&T has no significant experience in system software development and marketing. AT&T must rely on alliances for this experience and capability.

- Standard Computer Hardware - For many years, AT&T has developed its own line of computers to be used as the backbone of its many levels of automated switches. Outside of AT&T, however, acceptance has been limited. INPUT believes that AT&T will continue to have difficulty marketing its own line of general purpose hardware products and will continue to rely on alliances with other manufacturers to provide significant hardware components in its SI bids.

- Communications Hardware - AT&T's communications hardware reputation is extremely strong. INPUT believes that AT&T's only weakness in this area is the fact that AT&T has not been as successful as other vendors in packaging its own hardware with software and services to offer a comprehensive set of solution products.

- Network Management and Operations - As operator of the nation's largest telecommunications network, AT&T has an established reputation. INPUT believes that this is one of AT&T's greatest strengths. It remains to be seen whether AT&T can extend its credibility to networks of large (in numbers or size) computer systems.

- Service and Repair/Software Maintenance - AT&T has extensive experience in the servicing and repair of AT&T telecommunications equipment; these services are offered throughout the country, but traditionally only on its own equipment. Thus, AT&T has not yet shown itself to be a servicer of other manufacturers' equipment. As for software, AT&T has shown limited capabilities, consistent with the preceding comments on its offerings in that area.

9. SI Strategic Alliances

AT&T Computer Systems is developing both long-term and *ad hoc* contracts (i.e., alliances) with other vendors to complement its capabilities. AT&T relies primarily on contract-by-contract agreements for professional services; its long-term agreements provide sources for various types of computer hardware and systems software.
Exhibit ATT-3 lists some of AT&T's long-term alliances and the purposes they serve.

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EXHIBIT ATT-3

AT&T's Strategic Alliances

Alliance With	Purpose
Informix	System software
Intel	Computer hardware
Istel	Systems integration
Oracle	System software
Pyramid	Computer hardware
Sybase	System software
Tandem	Computer hardware
Microsoft	System software

10. SI Capabilities Summary

AT&T is one of the world's most capable providers of telecommunications facilities and services. In addition, due to its role in the telecommunications market, it has developed great expertise in the management of almost incredibly large projects—few companies would have either the economic strength or the management vision to undertake laying an underwater intercontinental telephone cable.

Until its primary market (long-distance telephone service) was deregulated and the local telephone switching centers were split off, AT&T did not have to compete, since it was guaranteed a fair rate of return under the regulatory rules then in effect. Even now, AT&T appears to have to fight a management inertia that prevents it from moving into new markets aggressively. Its very size, however, gives AT&T a level of economic strength that is most advantageous. Over the last year it has also become much more competitive in its base telephone business.

AT&T is beginning to broaden its range of capabilities through the formation of strategic alliances with companies whose products and

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services are well known and highly acclaimed. Thus, AT&T can now offer a nearly complete range of services to its SI market, ranging from advanced computer hardware through applications software based on advanced data management technologies. It remains to be seen how well AT&T can perform in the area of service and repair, where it must deal with non-AT&T equipment.

Exhibit ATT-4 summarizes INPUT's assessment of AT&T's SI capabilities.

EXHIBIT ATT-4

INPUT's Evaluation of AT&T's SI Capabilities

Strengths	Weaknesses
Strong telecommunications Extensive resources Excellent technical skills Large customer base Geographic presence Potential for alliances	Narrow experience base Regulatory control Strong competition Price restrictions Strategic focus

11. SI Marketing Strategy

AT&T Computer Systems' marketing strategy focuses on the growing market in network computing. This is an area where AT&T has great expertise and credibility.

In addition, AT&T has identified the following selection criteria for projects that it will show an interest in:

- Networking/communications requirements
- Fortune 2000 companies

These interests are clearly related to the area of AT&T's greatest strength: the development, implementation, and management of large-scale networks.

In both commercial and federal SI markets, AT&T sees its competitors as: IBM, DEC, Hewlett-Packard, NCR and Sun.

In its promotion, AT&T is beginning to use nearly all forms of advertising (other than direct mail); the most effective for AT&T are direct sales, trade/industry publications advertising, and word-of-mouth/client referrals.

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In its positioning, AT&T has great advantage as the world's leading authority on telecommunications services and network management.

12. SI Customer Base

AT&T's most significant contract for 1989 is the federal government's FTS-2000 contract to provide switched voice, switched data, packet switching, video transmission, switched digital integrated and dedicated transmission, and other services. In its final form, AT&T won 60% of a three-year, $450 million, revenue guarantee (U.S. Sprint won the other 40%). This is a level-of-service contract; thus, under this contract, the federal government will not lease additional circuits or purchase any hardware or facilities to support FTS-2000. Some of AT&T's SI contracts are identified in Exhibit ATT-5.

EXHIBIT ATT-5

Examples of AT&T's SI Projects

Company/Industry	Project Description	$ Millions
Transportation Dept., U.S.	Office Automation	Unknown
Chrysler Financial	Open Systems Platform in SNA Environment	Unknown
Amtrak	Ticket Agent Automation	Unknown
American Airlines	Travel Agent Automation	Unknown
Hyatt Hotels	Property Management/ Central Reservation Systems	Unknown

Since the beginning of 1988, AT&T indicated that it has undertaken approximately 200 commercial SI contracts and 10 federal SI contracts. AT&T would not disclose an average value of its SI contracts.

13. Summary and Future Directions

AT&T's most significant strengths are its capabilities and technical expertise in large-scale telecommunications. Few, if any, of its competitors can match AT&T in this area. AT&T has extensive resources to meet most needs relevant to the design, development, and management of telecommunications services; and it has a large nationwide customer base

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to market its SI services to. Also, AT&T has begun to form meaningful, long-term relationships with other manufacturers and services vendors that complement AT&T's capabilities and strengthen its competitive stance.

AT&T, however, has limited experience in designing, developing, implementing, and operating major applications software systems. The newly-increased number of significant alliances AT&T has entered into should help to fill out AT&T's capabilities and make it an ever more credible competitor in all areas of commercial and federal systems integration.

AT&T's recent interest in acquiring NCR suggests that AT&T should not be considered either a niche-market participant or even primarily a telecommunications services and facilities provider. Rather, it now appears that AT&T intends to compete fully in all aspects, including the SI segment of the information systems market.

With its economic strength, its depth of telecommunications expertise and growing breadth of capabilities augmented by its alliances, AT&T must be considered a major participant in the SI market. If AT&T succeeds in acquiring NCR and manages to combine their respective strengths, AT&T could become a dominant participant in the banking and retail SI markets and in other segments of the information services and products markets.

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COMPANY PROFILE

American Management Systems (AMS)

1. Key SI Contacts

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Commercial

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Vice Chairman
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Arlington, VA 22209
(703) 841-6000

Federal

Paul Brands
Executive Vice President
1777 North Kent Street
Arlington, VA 22209
(703) 841-6000

2. Description of Principal Business

American Management Systems (AMS) is a $200 million systems integrator which offers a full set of products and services to its targeted market. See Exhibit AMS-1.

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EXHIBIT AMS-1

AMS Offerings by Market

Offerings	Financial Services	Federal/ Aerospace	State/Local Universities	Telecommu-nication	Energy	Other Industries
Software Products	X	X	X	X	X	
Professional Services	X	X	X	X	X	X
Processing Services/ System Operations	X	X	X			X

AMS has been a pioneer in several ways:

- AMS successfully offers a combination of packaged software and services aimed at specific markets; many other companies have tried and failed in offering such a combination.

- AMS has used this approach successfully for over ten years in both the government and nongovernment markets. Many of AMS' federal market competitors have not been successful in the commercial market.

AMS has over 2,700 employees and has offices in more than 20 cities in the U.S. and Canada.

3. Competitive Position

AMS' principal achievement has been its ability to build businesses with good growth rates across five market areas, as shown in Exhibit AMS-2. This positioning across widely different sectors will prove especially important over the next few years as expected cuts in defense spending take place. AMS should be able to redeploy its assets more readily than many of its military systems integration (SI) competitors.

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EXHIBIT AMS-2

AMS Markets: Size and Growth

Market	1988 Revenues		Revenue Growth 1987-1988 (Percent)
	$ Million	Percent	
Federal/Aerospace	62.0	35.4	20
Financial Services	37.2	21.3	17
State/Local Governments and Universities	32.1	18.3	17
Telecommunications	11.2	6.4	64
Energy Industry	9.1	5.2	55
Other Industries	23.4	13.4	9
Total Revenues	175.0	100.0	21
Reimbursed Expenses	38.3		
Grand Total	213.3		

AMS' estimated systems integration revenues are shown in Exhibit AMS-3.

EXHIBIT AMS-3

AMS 1989 Systems Integration Revenues

Business Component	$ Millions
Federal	15
Commercial	125

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A related strength is AMS' special relationship with IBM. This will be described and analyzed in Section 5, below.

AMS has "proceduralized" much of its knowledge of specific markets into software packages. This often enables AMS to offer a combination of packaged and customized services to clients. This approach, when it works as intended, can offer the customer a high-quality system that meets specific customer requirements, at a lower cost and a faster implementation time than competitors that offer only packaged software or only customized solutions.

AMS is bound to have some problems with its federal defense business over the next few years, as programs are stretched out and cut back. Even though AMS' federal business only accounts for about one-third and its defense business for about 15% of AMS' overall revenues, the uncertainties associated with these businesses could still create management and financial problems for AMS.

A larger issue is whether AMS has the project and financial skills to achieve a significant level of profitability in its SI business. In principle, AMS should be quite profitable:

- Two-thirds of its business is already in the commercial market; most of that is in specialized vertical markets.
- One-third of its business is in software products, which usually have higher margins.
- Its professional services are largely aimed at more specialized and value-added areas, rather than at the lower margin "commodity" business.

However, AMS' operating margins (6-8% range) and net margins (3-4% range) look much more like that of a relatively undifferentiated professional services firm (or provider of federal government services). See Exhibit AMS-4. This raises questions as to whether changes in its management approach may not be necessary in order to bring AMS' financial returns in line with its successful growth and record of technical achievement.

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EXHIBIT AMS-4

AMS Margins

Margins	1988	1987	1986	1985
Operating (Percent)	5.2	7.7	7.6	5.8
Net	3.5	4.3	3.9	2.9

4. Markets Served

AMS targets five principal markets:

- Federal
- Financial Services
- State and Local Government
- Telecommunications
- Energy

The subsectors that AMS targets are shown in Exhibit AMS-5. AMS' business is almost wholly focused in the U.S., with less than 5% from Canada and negligible amounts from other foreign sources.

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EXHIBIT AMS-5

AMS Submarkets

Financial Services

- Commercial banks
- Thrift institutions
- Finance companies
- Investment banks and securities firms
- Insurance companies
- Diversified financial companies

Defense

- Military services
- Defense agencies
- Aerospace prime contractors

Civilian Federal Agencies

State, Local, and Other Governments

- States and state agencies and Canadian provincial governments
- Cities
- Counties
- School districts
- Canadian government ministries

Colleges and Universities

- Universities
- Four-year colleges
- Medical centers
- Community colleges

Telecommunications

- Local telephone companies
- Long distance and international carriers
- Information services providers

Energy Companies

Major Companies in Other Industries

- Retail
- Distribution
- Consumer products

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5. Recent Events

The most important recent event—in fact, one of the most important events since AMS' founding in 1970—was IBM's purchase of 10% of AMS' equity for $18 million, in July 1989.

This investment was part of the IBM's 1989 web of strategic investments in vertical market and implementation firms in the information services industry, including:

- Computer Task Group
- MSA (now part of D&B)
- Policy Management Systems

In these investments, IBM has had a number of motivations:

- To tighten its links with SI partners in selected vertical markets
- To make sure that key providers of IBM mainframe solutions do not come under the control of parties hostile to IBM
- To accelerate the implementation of SAA in key application areas
- To add to the product development capabilities (both financial and technical) of its key partners

In the case of AMS, all of these IBM objectives played a role in IBM's decision.

What advantages does this investment have for AMS? The most prominent advantages for AMS include:

- Cooperative marketing with IBM selling AMS products and services
- IBM's "stamp of approval," which is still important for many large customers
- A multiyear service contract to assist IBM in software product development
- The potential for AMS to migrate its business even faster from the federal to the commercial sector
- Making an unfriendly takeover of AMS more difficult
- IBM's technical cooperation (and advance information) on improving the technical aspects of AMS' offerings (e.g., embedding CASE tools, increased DB2 efficiency, distributed data bases, and processing)

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6. SI Organization

AMS' organizational structure is a complex, matrixed structure, made up of a combination of geographical, functional, vertical, and project factors. For example, AMS has 45 people with the title of Vice President. The largest differences in organization are between the federal and commercial sides of the business; the commercial side is far more decentralized, as shown in Exhibit AMS-6.

EXHIBIT AMS-6

AMS Organization—Centralization & Decentralization by Line of Business

Task	Commercial		Federal	
	Cent.	Decent.	Cent.	Decent.
Strategy & Long-Range Planning		X	X	
Marketing & Promotion		X	X	X
Account Management/Sales		X		X
Contract Review/Approval	X	X	X	
Project Management/Control		X		X
Implementation/Development		X		X
Hardware/Software Acquisition	X	X	X	
Systems Operations		X		X

AMS has several subsidiaries in addition to its core organizations, including:

- AMS Management Systems Canada; this group has its own subsidiary, Loecus Informatics (a 1988 acquisition).
- AMS Technical Systems, designed to compete and manage long-term defense contracts
- Data Base Management Inc. (acquired in 1986); DBMI has its own subsidiary, The Courseware Developers. Both these subsidiaries provide consulting and education services.

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7. SI Business Objectives

AMS' business objectives are to meet the total information systems needs of its clients. To do this, AMS will provide packaged software, semi-customized software, custom software, consulting, systems integration services, and systems operation services.

Being a public company whose entire business is centered around the segments described here, AMS must make the SI business (broadly defined) as profitable as possible.

8. Internal SI Capabilities Evaluation

a. Business Consulting

AMS offers the following types of business consulting services:

- Planning information systems (IS) applications
- Improving business (or government) operations with computer systems technology

Generally speaking, AMS only performs business consulting that has an involvement with information services.

b. Design Methodology, Design and Integration, Project Management, Software Development and Education, Training and Documentation

AMS has its own Lifecycle Productivity System (LPS) used to develop custom projects for clients. LPS is made up of a combination of third-party software and its own AMS-developed software. LPS handles all phases of the life cycle.

Part of LPS is the "CORE Foundation Software" of reusable application code modules. This helps AMS automate and control the content as well as the form of its custom applications.

c. Packaged Application Software

AMS has extensive offerings of applications software, divided into the following families of software products:

- Consumer credit management systems
- Corporate and international banking systems
- Federal financial systems
- State and local government management systems
- College and university management systems

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- Energy industry management systems
- Telecommunications industry management systems

As noted earlier, these application software products can be customized using AMS' own proprietary techniques.

d. Packaged Systems Software

AMS does not offer its own packaged systems software. However, as part of AMS' timesharing services—offered mainly to the federal sector—AMS does offer third-party products for use by its customers (e.g., graphics utilities and DBMS).

e. Standard Computer Hardware

AMS does not sell hardware.

f. Custom Computer Hardware

AMS does not develop custom computer hardware.

g. Network Management and Operations

AMS becomes involved in network management and operations in three primary ways:

- Through its own network, used to support its timesharing services

- Through applications that AMS has developed and subsequently operates. BureauLink is the best example of this: AMS serves as a neutral third party that manages communications and the exchange of information between the major North American credit bureaus.

- Through its products and services offered to the telecommunications industry. (See Section 4 for types of AMS customers in this segment.)

AMS, of course, develops many on-line and networked applications for its targeted customer groups.

h. Service and Repair

AMS has no significant service or repair offerings.

i. Software Maintenance

AMS has significant business in maintaining its own software products and delivered systems. In its federal business, it also maintains software written by the customer or by other contractors.

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9. SI Strategic Alliances

Looking into the future, the IBM alliance is AMS' principal alliance (see Section 5). In the past, AMS has teamed with a number of major contractors for specific jobs; such business partners have included GTE, McDonnell Douglas, Westinghouse, and General Dynamics. AMS has generally been a subcontractor in such relationships. INPUT expects such prime/sub relationships to continue, especially where the other partner is not a direct competitor to IBM. However, as discussed earlier, the federal business will become less important to AMS over the next several years.

AMS recently entered into a joint venture with Bell Atlantic called Bell Atlantic Systems Integration. This joint venture provides Bell Atlantic's three thousand account executives with a systems integration offering that addresses opportunities requiring information processing as well as telephone products and services.

10. SI Capabilities Summary

AMS is rich in SI capabilities:

- It is established in a number of key markets (see Exhibits AMS-1 and AMS-2).
- AMS has a proven capability of offering the full range of services needed to cover a client's SI needs.
- AMS has a good track record in implementing complex systems.

11. Marketing Strategy

INPUT expects to see both IBM and AMS benefit from their partnering strategy. AMS, especially, should find that doors are now open to it that were closed before.

Even without IBM, AMS is quite well positioned. Almost half of AMS' substantial commercial business comes from its existing client base.

AMS competes with—and often cooperates with—most of the leading federal SI players; AMS often competes as a member of a team. In the commercial sector, Andersen Consulting and, to a lesser degree, the other major accounting firms are competitors.

Because of AMS' vertical orientation, it competes against other specialists:

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- Firms such as Systems and Computer Technology that offer a full service approach to a particular need

- Software product firms such as Hogan or Computer Associates

12. SI Customer Base

AMS has a solid SI customer base. It has an important role in several large federal SI projects:

- Veterans Administration—Document and Imaging System
- U.S. Navy Paperless Ship—Shipboard Optical Disk Applications
- Department of the Interior—Minerals Management Service
- U.S. Navy—Naval Industrial Improvement Project

Although AMS indicates that it has participated in over 50 commercial SI projects since the beginning of 1987, its focus appears to have been more on providing professional services and tailored software than on being a prime contractor providing complete, integrated solutions. It has, however, increased its focus on commercial systems integration and will pursue a modest number of large SI projects.

13. Summary and Future Direction

AMS is one of the better-positioned SI companies, especially in commercial SI. This was no doubt a very important consideration in IBM's investment in AMS. INPUT expects to see AMS—in conjunction with IBM—mine its commercial sectors even more intensively in the future. AMS' balanced capabilities in software products, professional services, processing services, and systems operation make AMS nearly unique. (Policy Management Systems, another IBM investment, is one of the few similarly positioned companies.)

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COMPANY PROFILE

Ameritech Information Systems (AIS)

1. Key SI Contacts

Charles Zito
Vice President and General Manager
Systems Operations
Ameritech Information Systems
Suite 1700
500 West Madison
Chicago, IL 60606

2. Description of Principal Business

Ameritech is one of the leading providers of telecommunications services. Created as a part of the AT&T breakup, Ameritech's primary source of revenue is the provision of telephone and data services throughout the north central part of the United States.

Ameritech Information Systems (AIS) is an unregulated, independent division, of Ameritech Corporation. AIS has been providing systems integration services for three years to the commercial sector. No work is currently done in the federal market, although Ameritech is regularly evaluating that potential.

3. Ameritech Competitive Position

The company has developed a number of products and capabilities that provide a competitive advantage in its market areas. The following were specifically identified:

- CASE - Design methodology
- Industry Specific Software - Clinical data base system and a common user interface for the Windows environment.
- Industry Specific Software - Integrated library system for patron and staff use.
- Connectivity Products - Network operating systems, Fax gateway, and scheduling systems.
- Connectivity Products - LAN design, development, implementation, and operation tools and procedures.
- Hardware/Software Systems - Cross-industry application

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- Project Management Processes - Methodology applicable to all project types.
- Network Management Products - SNMP LAN manager. Automated Control of Evidence System - System to control evidence and auction management of property.
- Computer Aided Dispatch System
- Electronic Data Interchange Products and Services

Exhibit AIS-1 identifies the organizations that AIS considers its most significant competitors in systems integration.

EXHIBIT AIS-1

Key SI Competitors

Commercial	*Federal*
Andersen	Andersen
EDS	EDS
Oracle	Deloitte Touche
IBM	

4. Market Served

Like many vendors, AIS has selected a number of vertical industries as their key areas of concentration. The markets have been selected primarily on the basis of the requirements of existing clients. Key markets include:

- Healthcare
- Libraries
- Education
- State/Local Government (Public Safety)
- Finance

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In addition to the vertical market concentration, AIS has identified a number of cross-industry applications.

- Local area networks
- Network management
- Electronic data interchange
- Customer support systems
- Imaging systems
- Videoconferencing
- Proprietary/open systems integration
- Client/server architecture planning and development

5. Recent Events

AIS acquired Knowledge Data Systems of Salt Lake City, Utah on January 31,1991 for $26 million. Knowledge Data Systems provides integrated, multi-application data processing systems and related services to health care institutions and independent medical laboratories throughout the United States.

Another recent acquisition by AIS was for NOTIS Systems, Inc. of Evanston, Illinois on October 1,1991. NOTIS is a provider of academic library information software systems. NOTIS customers include large libraries and research institutions such as the University of Michigan and Indiana University, as well as public and corporate libraries.

Knowledge Data Systems and NOTIS Systems, Inc. will play a major role in AIS' existing efforts to further expand into the health care and library marketplaces.

6. Ameritech Organization

The organization is a mix of centralized and decentralized function. Planning and promotion are performed both centrally and through field staff. Hardware and software acquisition and administrative functions are performed centrally. All other activities are performed by field staff.

The company currently has 250 full time staff assigned to systems integration. Of the total, 65% are assigned to systems development, including project management and implementation activities. Fifteen percent are dedicated to sales activities and 10% are dedicated each to management and administrative activities.

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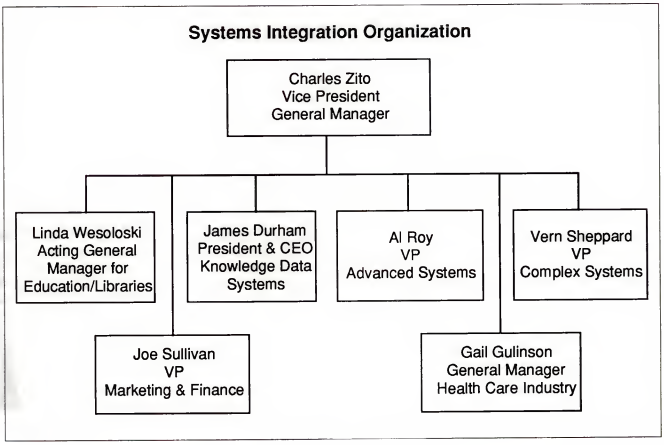
Exhibit AIS-2 provides a summary of key organizational units within AIS.

EXHIBIT AIS-2



7. SI Objectives and Revenues

Ameritech derives 90% of its systems integration revenues as a prime contractor. The other 10% is derived by supporting client managed projects. Fifty percent of their revenue is from their existing client base and 50% is from new clients. All current revenues are derived from the commercial market.

The company reports that profit margins are stable. The greatest margins are realized on custom software development and the lowest are realized on hardware and software. All others result in margins that would be considered average.

Ameritech expects that its systems integration revenues will grow at an annual rate of over 50% for at least the next three years.

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8. Internal SI Capabilities Evaluation

Ameritech believes that they currently have internal capabilities to perform most activities associated with systems integration. They place high value on expertise related to systems design and development, and management of large projects. They report that they have no alliances for these activities. However, they do have alliances to support customer needs for hardware, packaged application and system software, and activities such as maintenance.

9. SI Strategic Alliances

The company has informal, rather than formal, alliances. The primary purpose of AIS' alliances is to support joint development efforts when the vendor has a unique platform to meet a customer's needs. Their alliance program also provides a basis for technology transfer and for future planning.

Alliances are both short- and long-term. Key alliances include the following:

- Sigma Imaging Systems - Imaging Platform
- SpectraFax Corp. - Special request technology
- NedAdvice - Network design and consulting
- TELLABS - Technical information exchange
- US Sprint - Interexchange carrier services
- Unisys - Hardware/software
- IBM - Hardware/software
- DEC - Hardware/software
- ACD - Hardware/software
- Westinghouse - Unspecified

10. SI Marketing Strategy

As with most integrators, AIS derives the majority of its opportunities by leveraging work with existing clients (75%). Twenty five percent is derived from responses to proposal request.

The company does little public advertising. AIS conducts seminars and does direct mail advertising. They also participate in trade shows. Like many vendors in systems integration, particularly those in the commercial market, they place a great deal of emphasis on client reference.

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11. SI Customer Base

Ameritech's customer base is from the commercial market exclusively. The company has no federal clients and has not expressed strong interest in entering the federal market.

The report that contract values vary considerably, but are generally in the range of $500,000 to $1 million each. The value of contracts is increasing and the trend is expected to continue. The company reports that 40% of the value of contracts is for professional services. Thirty percent is for equipment and packages software respectively.

Ameritech's contracts reflect the industry trend to greater distribution of system activities. The company reports that 80% of their project revenues are for distributed systems. Only 20% are for mainframe based systems.

The company reports the following systems integration projects as examples.

- Roberts Express - Implement the migration of existing system to new, open, system environment supporting customer service, trucking and highway dispatch, two-way satellite communications and a number of administrative system processes.

- MECA - Implementation of a public safety and public service communications system in a multi-agency and multi-jurisdictional environment.

- IUPUI (Indiana University/Purdue University at Indianapolis) - Develop and provide a new library information system. System provides implementation plan to permit library to serve as focal point for application, demonstration, and development of present and emerging integrated technologies and information delivery.

- Chicago Transit Authority - Project to develop a metropolitan area network supporting voice, data, and video needs of the Authority's offices, rail terminals, rail stations, bus garages, and maintenance shops. Provides extensive reporting about fares and operating performance.

- SC Johnson - Develop systems architecture incorporating electronic imaging to support decentralized, financial management system.

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12. Summary and Future Directions

Ameritech Information Systems has made a good start at entering the systems integration market. It has chosen to enter by acquisition of *niche* companies, permitting it to provide integration services in such special areas as library services and the high-potential health services area.

These capabilities, coupled with the communications integration capabilities that Ameritech has inherent in its organization, should make it attractive as an integration option for users in these areas. Both of these markets could lead to entry into the state and local arena and the insurance industry, if early successes give it the proper credentials it needs.

Ameritech's early systems integration strategy seems suited to its current market position. This should provide it the potential for market growth in the upcoming year.

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COMPANY PROFILE

Andersen Consulting

1. Key SI Contacts

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Managing Partner
Andersen Consulting—Americas Region
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(214) 741-8400

Donald P. Monaco
Managing Partner
Integration Services & Technology—Americas
33 West Monroe Street
Chicago, IL 60603
(312) 580-0033

2. Description of Principal Business

Andersen Consulting provides technology and management consulting services to clients in nearly every business and government sector. Andersen helps its clients change themselves to be more competitive by linking their strategy, processes, people, and technology. In September 1989, Andersen Consulting assumed the operations, activities, and personnel of the former Management Information Consulting practice of Arthur Andersen, which provides accounting, audit, and tax services. Andersen Consulting now operates as a separate legal entity.

A breakdown of Andersen Consulting's services is as follows:

- Strategic Services
- Systems Integration
- Change Management Services
- Business Process Management

Andersen Consulting (AC) has offered management consulting services since 1948, and information services-related consulting since the early 1950s. Andersen Consulting derived $2.3 billion of revenue from consulting services in fiscal year 1991.

Of Andersen Consulting's revenue, approximately 30% can be attributed to pure professional services contracts, 65% to systems integration (SI), and the remaining 5% to applications and systems software products. INPUT's estimate of the detailed breakdown is contained in Exhibit AC-1.

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In the past Andersen did not directly supply any equipment or systems software products for an SI engagement. Although this has changed somewhat, INPUT estimates that the SI revenue amount would be about 30% higher if Andersen provided all of the SI-related equipment.

EXHIBIT AC-1

Key Parameters of Andersen Consulting's Consulting/SI Business

Parameter	U.S. ($M)	Total ($M)
IS practice revenues (1)	1,090	2,267
IS practice personnel	10,070	21,668
Systems integration revenue (1), (2)	745	1,045

(1) Fiscal year August 31, 1990, to August 31, 1991
(2) Calculated by INPUT

Andersen Consulting has been one of the most phenomenally successful knowledge-related businesses of the last 20 years. Revered at one moment by its competitors in the information services marketplace, and not taken seriously at others, the consulting operation has consistently shown significant growth rates and defeated the competition on a regular basis. Its commitment to the information services market has resulted in significant developments over the past several years.

3. Andersen Consulting Competitive Position

Andersen's estimated $1,090 million revenue in information systems (IS) consulting makes it the leader among the Big 6.

Andersen Consulting's strengths include contacts at the senior executive level at customer companies. Each IS partner is expected to contact senior officers at their top accounts. In addition, Andersen Consulting offers extensive in-house staff training and has a strong services-oriented culture. AC has developed a variety of strong third-party hardware and software vendor relationships to support it in its information services consulting business.

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INPUT does not believe that AC has any significant weaknesses. However, some problems do exist. First, AC's partnership culture has traditionally worked against change. The vertical industry focus facilitates successful SI programs but places an excessive travel burden on the specialist partners. Recent developments within the organization are likely to minimize the effect of this problem. Second, AC's approach to systems integration has been heavily business-process-oriented. Top-down in nature, the approach is not suitable for every client. Finally, AC's strengths in the international component of the IS/SI market have significantly lagged behind the U.S. operations. However, AC is rapidly building these capabilities. In recent years, Andersen's growth in non-U.S. market has been two to three times the growth in the U.S. market. Exhibit AC-2 summarizes INPUT's assessment of Andersen Consulting's competitive strengths and weaknesses as they apply to the systems integration business.

EXHIBIT AC-2

Andersen Consulting's Competitive Status

SI Strengths	SI Weaknesses
Total Solution	
High-level client contacts	Partnership culture
In-house training capability	Reliance on methodology
"Professional services culture"	
Strong third-party relationships	

4. Markets Served

Andersen Consulting's U.S. systems integration business focuses almost exclusively on vertical markets, but in effect covers almost all of the commercial and government sectors, including

- State and local government
- Discrete manufacturing
- Wholesale and retail distribution
- Financial services
- Health care
- Insurance
- Utilities
- Process manufacturing
- Transportation
- Telecommunications
- Energy and gas
- Federal government

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Although AC has clearly demonstrated capability in all the markets listed above, from a historical perspective INPUT believes that AC's primary focus in these vertical industries in order of importance has been as follows: manufacturing, distribution, state and local government, financial services, and telecommunications.

Furthermore, although many competitors consider Andersen Consulting "invisible" in the federal SI marketplace, AC has placed emphasis on developing business in that arena. But, compared to the other leading SI vendors, Andersen has been less successful in developing this market segment. The SI vendors with hardware and aerospace background have a competitive advantage in this market.

5. Recent Events

A number of significant events have impacted Andersen Consulting's position in the SI market over the past three years.

- AC has placed significant emphasis on the development of alliances in the software community, including Oracle, PeopleSoft, Coda, QSP, Lotus, SAP (West German cross-industry financial packages), and many others. Hardware alliances have been formed with IBM, Digital, Hewlett-Packard (H-P), Sun Microsystems, and Tandem.

- AC has focused on the development and aggressive marketing of its own software products, including FOUNDATION (integrated full life cycle CASE tool set); DCS/Logistics (Distribution Control System); the "MAC-PAC" line of integrated manufacturing software; and PROCESS/1, an open software solution for the process industry.

- Andersen Consulting made a number of acquisitions during 1989.

Acquisitions include the following:

- In September 1989, Andersen Consulting acquired Rossmore Warwick, a 25-to-30-person British engineering firm that helps design new factories and new process lines.

- In July 1989, Andersen Consulting acquired Courseware, Inc. of San Diego, CA. Terms of the acquisition were not disclosed.

  - Courseware provides computer-based training and training support services to clients in insurance, data processing, communications, real estate, defense, aerospace, and travel, as well as state and federal government. The company had 60 employees at the time of the acquisition and 1988 gross fees of $5.2 million.

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- The operations of Courseware have been merged into Andersen Consulting's Change Management Services (CMS) practice.

- In January 1989, Andersen Consulting acquired McCormack & Dodge PIOS manufacturing resource planning system. This product and the related employees have been merged into the Application Product Group.

- Other 1989 acquisitions include

  - Computer Management Associates, a consulting firm in Oslo (Norway)

  - Synerlogic, a Canadian consulting firm

  - CMC Consoltores, a Spanish consulting firm

INPUT is not aware of further acquisition activity by Andersen since 1989.

As discussed earlier (Section 2), the formation of Andersen Consulting represented an important change in the firm's outlook on the consulting/ IS/SI business.

Andersen's growth has not been painless. A number of key systems integration management personnel have left to start new companies or strengthen competitors.

In 1988, several senior partners departed Andersen Consulting to form another firm, Information Consulting Group, financed by Saatchi and Saatchi. This venture was not successful, and has since been purchased by McKinsey and Co.

In 1989, Mel Bergstein, a senior Andersen Consulting partner, joined Computer Sciences Corporation (CSC) and became Senior Vice President of systems integration. Two additional key partners joined him at CSC. Mr. Bergstein has since left CSC and joined TSC.

In June of 1991, the worldwide managing partner of Integration Services, Mr. John Oltman, joined SHL Systemhouse as chairman and CEO. Mr. James Burns, who was also worldwide head of SI before going to Goldman Sachs, has also joined Systemhouse. Other senior level defections to Systemhouse include Robert Boyd, David Larson, Kevin Rowe, Henry Burgess, Daniel Carter, James Bernstein, John Bunnell, Philip York, Gary James, and William DeVitt.

Due to the recognized high quality of Andersen's SI partners and program managers, they will always be targets for other company's recruiting efforts.

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In July 1990, the Securities and Exchange Commission ruled that Andersen Consulting could partner with the Arthur Andersen's audit clients. This permits the firm to establish alliances with audit clients such as Oracle and Amdahl. Andersen can also now enter SI engagements with audit clients.

Exhibit AC-3 summarizes major recent events impacting Andersen Consulting's position in the SI marketplace.

EXHIBIT AC-3

Andersen Consulting—Major Recent Developments

- Extensive formation of application software alliances
- Aggressive formation of hardware and systems software alliances
- Development/promotion of internally developed software
- Reorganization to support SI/IS business

6. Organization

Andersen Consulting manages and delivers its services through the matrixed structure depicted in Exhibit AC-4. The organization is headed by Mr. George Shaheen. Reporting to him are managing partners with operational responsibility for three major geographic areas: the Americas, EMEAI (Europe, Middle East, Africa, and India), and the Asia and Pacific area. These partners have responsibility for delivering all of AC's services to their clients.

Market Development is responsible for Andersen Consulting's image, industry practices, and most recently, strategic services and change management services service lines. Six key industry practices are assigned managing partners who are responsible for setting the strategic direction and building the industry practice. Those industries are

- Financial services (includes insurance, financial markets, and retail financial services)
- Government
- Healthcare

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- Products (includes discrete and process manufacturing, aerospace and defense, and retail and wholesale distribution)
- Telecommunications
- Utilities

Strategic Services assists clients in forming and managing their strategic planning processes. Included are services that analyze the client's marketplace and competitive position, identify strategic alternatives, establish a formal direction, and monitor the execution of strategies.

The Change Management Services practice works with organizations to manage all elements of change. These services focus on organizational structure, knowledge transfer, and the assimilation of technology and people.

Systems Integration includes the full range of development and integration activities. Business Process Management includes facilities management, data center and network operations, and remote processing. In Andersen Consulting's Americas region, Systems Integration and Business Process Management are part of the organization's Integration Services and Technology (IS&T) organization. IS&T also includes Andersen Consulting's Business Integration Partnership alliance management program and distributed technology groups.

Additional areas that report to Mr. Shaheen include Technology Services, which is responsible for technical excellence (including products such as FOUNDATION).

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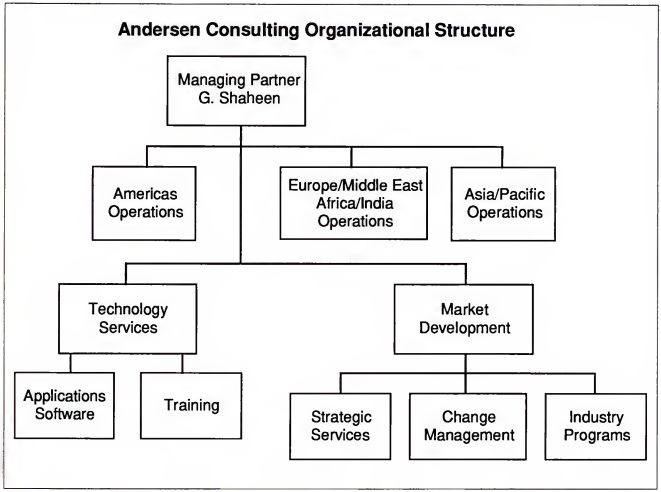
EXHIBIT AC-4



Andersen Consulting utilizes a highly matrixed organizational structure. In the Americas the entire Integration Services and Technology practice is the responsibility of Mr. Donald P. Monaco. Six key industries are assigned managing partners: financial services (includes insurance), health care, products (includes manufacturing and distribution), utilities, telecommunications, and government (includes federal, state, and local). There are also six Integration Services and Technology regional directors. Exhibit AC-5 shows Andersen Consulting's Integration Services and technology organizational structure for the Americas.

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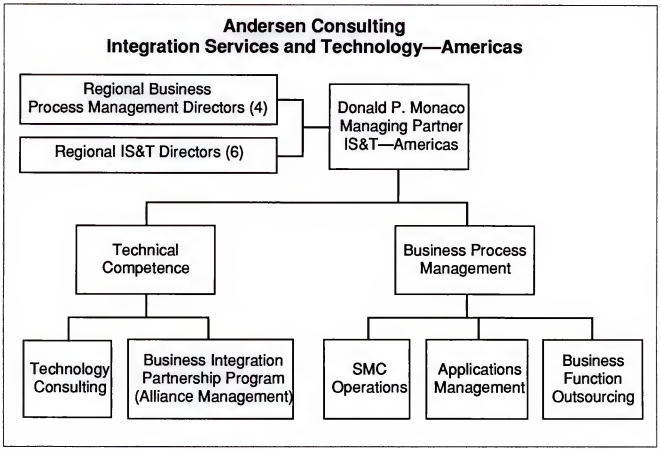
EXHIBIT AC-5



Based on INPUT's interviews with Andersen Consulting, responsibilities are distributed in accordance with Exhibit AC-6, which compares how major responsibilities are managed within the commercial and federal organizations, respectively. A "C" indicates that the responsibility for the activity in question is primarily centralized, a "D" means decentralized, and a "B" indicates that the responsibility is shared by both.

Centralized groups handle marketing, risk management assessment insurance, national contract purchasing, and other activities. Regional offices provide the emphasis and most of the technical professionals necessary for systems integration projects.

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EXHIBIT AC-6

Centralization/Decentralization of SI Business Function
Andersen Consulting

Responsibilities	Commercial	Federal
Strategy and long-range planning	C	C
Marketing and promotion	B	C
Account management/sales	D	D
Contract review/approval	B	C
Project management/control	D	D
Implementation/development	D	D
Hardware/software acquisition	B	B
Systems operations (if applicable)	D	D

C = Centralized, D = Decentralized, B = Both

Andersen Consulting has established a number of systems management, advanced technology, and business integration centers to support its activities.

- Andersen Consulting currently has five sites for its business integration centers, which specialize in industry- and function-specific technology. These centers serve as facilities where industry project teams from around the world build and demonstrate visions of the future through full-scale working technology exhibits (e.g., a factory floor or hospital of the future). These demonstration centers are continuously updated and enable clients to visualize how leading edge technologies can be integrated into their own business environments.

  - Business integration centers are located in Chicago, Dallas, and Atlanta.

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- SMART STORE 2000, located in Chicago, is a showcase of Andersen Consulting's vision for the food pipeline process through the retailer. The exhibit incorporates state-of-the-art hardware and software applied by more than 40 participating vendors and addresses food industry management concerns about the future.

- Andersen's LOGISTICS/2000 exhibit in Atlanta demonstrates how the integration of technology can benefit a logistics organization. It includes an automated warehouse and offices for sales and customer service, inventory management, transportation management, and executive management.

- Also in Atlanta, PROCESS 2000 focuses on the operation of an innovative chemical manufacturer. The center shows the benefits of applying process re-engineering and technology.

- Another business integration center, Hospital of the Future, represents Andersen Consulting's vision of the systems technologies that will support the health care delivery system of the 1990s. Located in Dallas, the exhibit will serve as a permanent site for Andersen Consulting and more than 20 participating vendors.

- The Retail Place, also located in Chicago, demonstrates a customer-driven retail operation, including sales floor, distribution center, and corporate office. The functional exhibits physically illustrate the implementation of the key strategies of customer-driven marketing, value-driven operations, and strategic vendor partnering.

Andersen Consulting reports a full-time, worldwide SI practice staff of 22,000. Exhibit AC-7 gives an indication of the distribution of personnel resources between various SI-related activities.

7. SI Business Objectives

Andersen Consulting wants to gain and maintain a market leadership position by being the preeminent provider of solutions to major organizations worldwide. The focus is on providing a full-service solution. Although not explicitly stated in the interview process, INPUT believes that Andersen Consulting sees itself as taking leadership as the "respected consultant/provider of strategic information systems." There appears to be three unstated business objectives:

- Emphasize all service lines to create a full-solution offering to compete with smaller niche consultancies.

- Link technology with strategic consulting, process management, and change management (people processes).

- Dominate the business process re-engineering service offering.

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EXHIBIT AC-7

Distribution of SI Business Personnel
Andersen Consulting

Capability	Percent
Management, strategy, planning, marketing	5
Legal/contract administration, finance	1
Project management and administration	10
Design/development/implementation	74
Hardware/software evaluation/acquisition	5
Hardware engineering	1
Sales	4

From a business perspective, Andersen Consulting sees the revenue and profits from systems integration as a primary motivation to develop the business. That is, SI is a standalone business in terms of strategy and profitability analysis. As would be expected, proliferation of hardware and follow-on facilities management contracts are not of primary interest, although the latter has become more important in competing as a full-service provider.

It is INPUT's evaluation that Andersen is capitalizing on its industry reputation as business consultants to build a strategic dominance in the business process re-engineering domain. Andersen Consulting is positioning itself to capture the client relationship at the earliest possible point and then develop the entire SI engagement. This business strategy has obvious advantages and Andersen can successfully execute it.

8. SI Capabilities Evaluation

And as might be expected, Andersen Consulting has full in-house capability at the high end of the development life cycle, and also as might be expected, makes heavy use of alliances in the areas of systems software, hardware, custom and communications hardware, and hardware maintenance. A summary of Andersen Consulting's capabilities follows:

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- Business Consulting, Design, and Project Management—Clearly this is the area of Andersen Consulting's strength. The combination of a solid methodology along with uniform and effective training of its personnel produces consistent, if not always exceptional, results. Consistent with the professional services orientation of the firm, education, training, and documentation are also significant skills that AC markets heavily as part of its capabilities.

- Packaged Applications Software—This is clearly an area of strength for AC. It has made significant investments in the development of numerous packages. (See Section 5 and Exhibit AC-8). The aggressive marketing of these packages, along with the development and utilization of strong alliances to fill the gaps, gives Andersen Consulting a very strong position within its competitive group in the applications software area.

- Systems Software/Computer and Communications Hardware—This is an area where Andersen Consulting consistently utilizes other vendors' products, most often through alliances.

- Network Management/Operations—Although AC does have some contracts in which it performs these functions, this area is neither a primary focus of business nor an area of strength. Because of the long-term importance of networks to worldwide business solutions, AC recently announced an alliance with Infonet and SigmaNet, which have worldwide networking capability.

- Andersen has identified the systems operations, systems management, networking management, and outsourcing service area as one of potential growth. For a detailed analysis, consult the Andersen Consulting vendor profile from INPUT's *Information Systems Outsourcing Competitive Analysis*.

In the past, one criticism of Andersen would have been a lack of true in-depth focus on technology. This deficiency has been aggressively addressed with a multipronged approach. the business integration centers display leading edge uses of technology. Andersen was the first services-oriented company to join the research consortium MCC. It is are also a member of the Institute for the Learning Sciences, Software Engineering Research Center, and Software Engineering Institute research consortium. AC has aggressively recruited senior technologists for CSTaR.

CSTaR is tasked with researching and developing uses of technology to solve business problems. CSTaR is part of Technology Services, which also has organizational focus on methodologies, tools, training, network solutions, client/server and downsized architectures, image systems, artificial intelligence, and other advanced developments.

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EXHIBIT AC-8

Andersen Consulting
Applications Software Products—Some Examples

Product	Description
MAC-PAC/D Family of Products	Specialized, fully integrated manufacturing enterprise management system for aerospace and defense contractors and other project-oriented manufacturers.
MAC-PAC for the IBM AS/400	Integrates manufacturing, distribution, and finance into a single on-line management system. MAC-PAC provides the flexibility needed to operate in a full Manufacturing Resource Planning MRP II), Just-in-Time (JIT), or a mixed MRP/JIT environment. It integrates multiple processes, products, and businesses for enterprise-wide management.
DCS/Logistics DCS/Logistics for the VAX	On-line Digital VAX and IBM mainframe-based computer system with applications that support the order processing, inventory management, distribution, warehouse management, and logistics function of medium-to-large manufacturers, distributors, wholesale distributors, or retail distributors.
PROCESS/1	Complete software solution engineered for the process industry. Software provides companies with the flexibility to support distributed plant operations while maintaining critical linkages with enterprise and process control systems.
FOUNDATION	A comprehensive, integrated ICASE tool set that includes FOUNDATION for Cooperative Processing, METHOD/I, PLAN/I, DESIGN/I, and INSTALL/I.
PIOS	(Production and Inventory Optimization System). On-line manufacturing control system acquired from McCormack & Dodge.

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In fiscal year 1993, Andersen established a technology competence group in the Americas region. As part of IS&T, it seeks to disseminate technology skills in AC's Americas region. One example of the focus on technology is that each Andersen consultant receives 500 hours of client/server training.

INPUT believes that, overall, Andersen Consulting has significant capabilities in the areas that are most important for winning and executing SI contracts. Its focus on the top end of the life cycle, and perceived strengths in understanding business solutions in many industry sectors gives it an edge on the market that few others have.

9. SI Strategic Alliances

Andersen Consulting has established some significant alliances that strengthen the firm's SI capabilities. As with most other major systems integrators, AC utilizes both long-term and project-by-project alliances. AC believes that the use of alliances supports its strategy for SI by:

- Enabling Andersen to provide a complete solution of applications software, hardware, and networks
- Giving it early access to new technologies
- Providing assistance in financing projects
- Supplementing areas where it has limited internal capability, such as maintenance support and worldwide communications

The majority of its longer term alliances have evolved from working with particular subcontractors or partners on a repetitive basis. Other alliances have developed as a result of Andersen's strategy to develop industry-specific software.

In 1989 Andersen Consulting established the Business Integration Partnership (BIP) program. The objective of the program is to enhance Andersen Consulting's capability through alliances with leading hardware and systems software vendors. Alliances with technology vendors enable AC to bundle products and services in the solutions it provides to clients and allows the client to deal with a single solution provider.

Through value-added reseller and systems integrator agreements, Andersen Consulting resells or jointly markets its BIP technologies as part of a full-service solution. The agreements are non-exclusive and typically do not have a vertical market focus. However, many of the vendors' products are featured as key components of the technologies demonstrated at Andersen's business integration centers.

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Andersen's BIP program focuses on establishing alliances necessary to fulfill AC's mission to be the premier provider of full-service re-engineering. To this end its alliances include H-P, Digital, AT&T/NCR, IBM, Sun Microsystems, Informix, Sybase, and other leading hardware and systems software vendors. Special emphasis is on establishing reseller agreements that support Andersen's development of client/server solutions.

10. SI Capabilities Summary

Andersen Consulting's strengths far outweigh its weaknesses as a systems integrator. In fact, its strong set of capabilities in the high end of the life cycle serves to reduce significantly its dependencies on outside suppliers for the high-risk elements of most SI contracts. Its strengths in software development, project management, and packaged systems and applications software have contributed measurably to the firm's success. The weaknesses in service and repair and, to some degree, equipment design integration, are not critical to success in the business, particularly in the vertical markets on which AC has focused.

Andersen Consulting's alliances and applications software offerings also add significantly to its overall capabilities. The FOUNDATION development and implementation methodology is probably the best-known package of its type in the industry.

Finally, Andersen Consulting has always placed heavy emphasis on training. Utilizing its internal training and development capabilities, Andersen Consulting has adopted a strategy of consistent development of its staff. Therefore, AC professional personnel understand the processes used in acquiring and executing the business. They can be deployed in the organization when and where needed. The resulting consistency from this approach facilitates the effective deployment of personnel in SI efforts and is a great asset. Andersen states that it spent approximately $7,200 on each consulting professional for internal training in fiscal year 1991—a total cost of $151 million. This equates to an average of 19 person days per consultant per year.

11. SI Marketing Strategy

The backbone of Andersen Consulting's marketing approach is its vertical business focus and business process orientation (See Section 4). The process is targeted at developing high-level business solutions and converting them into the application of information technology. AC was one of the first, and clearly is one of the most successful, systems integrators to approach the mission-critical systems market. AC methodology is at the heart of each project. AC understands the value of developing relationships with high-level managers in target firms and industries and very effectively utilizes referral selling at these levels. AC's demonstrated capability of dealing with projects over $50 million makes it one of the few commercial systems integrators that can make that claim.

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EXHIBIT AC-9

Andersen Consulting—SI Strategic Alliances (Limited Sample)

Product	Description	
Hardware	Amdahl IBM Hewlett-Packard DEC	Tandem Sun Microsystems AT&T/NCR
Applications Software	SAP (Financial) Lotus Oracle	Coda PeopleSoft QSP
Systems Software	IBM Informix Trinzic	
Cooperative Marketing	Aetna (Insurance)	
Networking/ Telecommunications	Infonet Synoptics SigmaNet	

In addition, as part of its marketing process, AC has developed and utilizes five business integration centers, which feature conceptual demonstrations of potential new technology integration and utilization. The business integration centers are a unique marketing approach. The centers are an excellent vehicle to demonstrate to the client what an SI program could accomplish.

- Competitors: Andersen Consulting sees IBM and EDS as its prime competitors. In the federal marketplace, it adds CSC to that list. As AC broadens its targets to smaller systems opportunities, it will undoubtedly find a few more competitors.

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- Positioning: Andersen Consulting's primary positioning with respect to customers/prospects is to promote its ability to help its clients change their organizations to be more competitive by linking strategy, process, people, and technology. AC uses this consistent theme in combination with its in-depth vertical industry expertise to present itself as the number one seller of business solutions. AC has invested heavily in recent years in developing its technological expertise. Though this is still not a primary positioning point, it certainly plays a role when presenting the entire package to the customer. INPUT believes these capabilities will become more significant in the future.

- Promotion: Andersen Consulting uses essentially all forms of promotion for its SI market strategy, even network television. However, AC indicates that the jury is out on all approaches except qualified client referrals, direct marketing, and utilization of the business integration centers, which it rates as highly effective. In addition, AC uses public seminars with some degree of success.

Finally, INPUT believes that Andersen Consulting enjoys a strong marketing position among leading systems integrators that is worthy of comment. AC frequently "writes" the RFP, at least in the figurative sense. AC's business consulting skills often give it entry to the prospect's environment long before a solution or even, at times, the problem, has been defined. Operating from a high-level position as a consultant and supported by its comprehensive methodology (METHOD/I), AC has often closed the business before it has been opened. As a full-service provider, AC is a logical selection for implementor once the consulting is done. Exhibit AC-10 summarizes Andersen Consulting's market strategy.

EXHIBIT AC-10

Andersen Consulting Marketing Strategy

- Direct marketing/business processes
- Strong methodology
- Vertical market focus for commercial marketplace
- Primary competitors: IBM, EDS, CSC
- Positioning: Industry/business knowledge, re-engineering, full-service
- Promotion: referral, technology centers

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12. SI Customer Base Specific Projects

Andersen Consulting reports that about 80% of its commercial systems integration clients come from its existing account base and about 20% from new prospects specifically solicited for SI. In the federal marketplace, the split is 50% from each source. Undoubtedly, the high percentage of repeat business in the commercial market reflects AC's long-term account relationships with larger firms, while the 50/50 split in the federal market is indicative of its more recent entry into that marketplace and the fact that the federal market is more RFP-driven. In both markets, AC claims that its business has been profitable.

In recent years, AC has moved from a position of mainly pursuing very large projects to soliciting smaller ones as well. INPUT estimates that AC wins almost 60% of the projects it actively bids on; and it has completed projects ranging from $2 million to $80 million (average size about $10 million). AC's top commercial customers are concentrated in discrete and process manufacturing, telecommunications, state and local government, banking and insurance, airlines, and the federal government.

It is also interesting to note that Andersen has performed SI engagements for companies that have their own SI capabilities like Ameritech, Boeing, Lockheed, and Martin Marietta.

Exhibit AC-11 contains information on some of AC's key SI engagements.

13. Summary and Future Directions

Andersen Consulting has an excellent overall image and capability as a systems integrator. Strengths include its ability to manage the client's planning process, the resources to handle very large projects, and its focus on professional services. Its ongoing investments in key applications software products and the continued development and education of its professional staff will continue to build the positive momentum it has in the marketplace. Recent investment in technology will pay dividends in the near future.

Not to be overlooked on the positive side is AC's ability to formulate client requirements. Focusing on the high end of the life cycle, AC frequently "writes" the RFP, so to speak—a position that many of its competitors envy. The result is a very high success rate in winning contracts, which minimizes marketing and bid preparation costs.

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EXHIBIT AC-11

Examples of Andersen Consulting's SI Contracts

Company or Industry	Project Description	$ Millions
Lockheed	Computer-aided layout/fabrication	3.0
Ashland Chemical	Order entry/ inventory control	5.5
Ca. Dept./ Development Services	Cost recovery system	3.6
Jet Propulsion Laboratory	Integrated management and administrative system	10.2
State of Texas	Executive information system and decision support system linked	2.6
Prudential Corporation	Image processing system	4.2
State of Montana	Human services systems	15.5
Department of Veteran Affairs	Integrated supply management systems	5.8
Northwest Airlines	Revenue accounting, image processing	NA
1992 Winter Olympics 1994 Winter Olympics	Build client/server system to manage Games, report statistics	4.5 (1994 contract)

NA = Not available

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In those areas where Andersen Consulting might be perceived as being weak, plans are in place to strengthen capabilities.

- The "by the book" (perceived by some as overly structured) approach to design and engineering is fading as higher level and better trained consultants enter the SI practice.

- A weak technical image is being overcome by heavy investment in proprietary technology and strategic business solutions using multiple sources of technology.

The future looks bright for Andersen Consulting. INPUT expects its market approach to become more aggressive. INPUT anticipates increased focus on Europe and Asia. In addition, the market can anticipate further heavy investments by AC in technology to support both vertical and, to a lesser extent, cross-industry markets.

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COMPANY PROFILE

BDM International, Inc.

1. Key SI Contacts

BDM International, Inc.
7915 Jones Branch Drive
McLean, VA 22102
Dr. William E. Sweeney, Jr.
Executive Vice President
Andrew F. Bilinski
Corporate Vice President
(703) 848-5000

2. Description of Principal Business

BDM International, Inc. is a diversified growth-oriented professional and technical services firm that provides advanced technology and other contract support to public and private sector clients. The company serves clients in defense, communications, logistics, energy, environment, space , transportation, manufacturing, product distribution, and public policy.

A small company named Braddock, Dunn, and McDonald, Inc. (for its three physicist founders) began operations in 1960. Its offices were in El Paso, Texas, near the U.S. Army's White Sands Missile Range, BDM's first client. The decade of the sixties was one of modest but steady growth and expansion of BDM's technology, client, and revenue base. By 1970, BDM had neared $4 million in annual revenue.

Growth accelerated sharply in the second decade. BDM moved its headquarters to metropolitan Washington, D.C., where a management team headed by President and CEO Earle Williams began planning and directing business development. The Company's name was changed twice, first to the BDM Corporation (1975) and then to BDM International, Inc. (1979)

Diversification into new areas of energy, environment, transportation, and public policy marked the 1970s, although the business base remained largely—85% or more—associated with national defense. At the end of the decade, BDM operated 20 offices including one in Saudi Arabia. 1980 revenue totaled $83 million.

BDM's initial public stock offering took place in 1980, followed two years later by the company's listing on the American Stock Exchange. Revenues continued to climb, exceeding $100 million in 1982, $200 million in 1985, and $300 million in 1986.

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In 1988, BDM was acquired by Ford to operate as a separate professional services subsidiary of Ford Aerospace Corporation. In early 1990, Ford Motor Company announced its intention to sell all of Ford Aerospace. BDM, concerned about existing and potential conflict-of-interest perceptions and their impact on its business, sought to be spun off separately. BDM management was supported in this objective by the Carlyle Group, L.P., a Washington-based merchant banking firm headed by former Defense Secretary Frank Carlucci. As a result, BDM reemerged as an independent company (BDM Holdings, Inc.) in October 1990, allied with Carlyle. BDM International continues to be the principal operating company.

In 1991, BDM common stock was made available for a limited time to company employees. Today the company is owned in part by these employees as well as by senior BDM management, Carlyle, and certain other investors. The company is financially sound.

In March 1992, BDM Holdings acquired Vinnell Corporation of Fairfax, VA. Vinnell is a $100 million professional and technical services company with approximately 1,700 employees. It provides training, operations, and maintenance services to a variety of U.S. and foreign government agencies. Vinnell and BDM will operate as separate sister companies.

BDM's 1991 revenue (prior to the Vinnell Acquisition) reached $296.8 million and net income was $520,000. In Exhibit BDM-1, financials for 1990 have been segmented to show BDM's operations as a subsidiary of Ford (January through September 1990) and as an independent company (October through December 1990).

EXHIBIT BDM-1

BDM Financial Summary

	Fiscal Period ($ Millions)			
Item	1991	10/1/90-12/31/90	1/1/90-9/30/90	1989
Revenue	296.8	74.0	232.2	355.9
Gross Profit	23.3	6.1	14.2	28.1
Net income (loss)	0.5	0.3	(4.3)	8.2
Earnings (loss) per share	0.05	0.04	N/A	N/A

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Revenue for 1991 decreased 3% ($9.5 million) compared with 1990 due primarily to a reduction of hardware purchases by clients and less use of subcontractors.

- The company's business mix has shifted to non-Department of Defense (DoD) markets. As a percentage of total revenue, DoD revenues declined from approximately 73% for 1990 to approximately 67% during 1991. The increases in other client revenues are due primarily to new contracts with other federal government agencies such as NASA and the Department of Energy.

- Revenue from cost-plus (CPF) contracts increased nearly 3% ($5.1 million), while revenue from fixed-price (FP) and time-and-materials (T&M) contracts decreased by over 7% ($7.5 million) and 26% ($7.1 million), respectively, during 1991.

As of October 1992 BDM had 2,800 employees. This is an increase of approximately 10% over 1991; revenue growth in the same range is expected for 1992 compared with 1991. The parent company currently has 4,500 employees, including those acquired with Vinnell in March 1992.

BDM had $140 million in systems integration (SI) revenue in 1990 and $150 million in 1991. Most of that, 86% or $120 million in 1990 and 83% or $125 million in 1991, was from federal SI. BDM estimates that its average annual growth rate for commercial SI will be twice its federal SI rate of 6%. BDM estimates that its margins for both commercial and federal business will remain stable.

Exhibit BDM-2 shows the mix of products and services in the company's commercial and federal contracts.

EXHIBIT BDM-2

Mix of Products and Services

Product/Service	Percent of Contract Value	
	Commercial	Federal
Equipment	40	15
Packaged Software	20	5
Professional Services	20	40
Software Development	20	40

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In keeping with the new paradigm for SI, 80% of the company's SI projects are based on distributed systems. INPUT expects this is because 90% of its commercial SI business comes from new accounts. During 1991, BDM worked on 800 different contracts, many of which involved multiple services and tasks.

BDM provides professional and technical services, under contract, to clients in defense, communications, logistics, energy, the environment, space, transportation, manufacturing, product distribution, and public policy.

- BDM applies its expertise in systems engineering and development (including systems architecture, design, and integration) to meet the requirements for information and data systems, advanced manufacturing systems, and communications networks and systems—and their combinations.

- BDM applies advanced technology to solve problems and improve operational and systems performance and effectiveness. The company's technology base includes methods and procedures (modeling, simulation, planning and analysis tools) and systems methodologies (software productivity, computer-integrated manufacturing, concurrent design, and manufacturing), as well as artificial intelligence, advanced computing, image processing, microelectronics, sensors, photonics, lasers and optics, artificial neural systems, intelligent processing of materials, robotics, and other areas.

With the retirement of Mr. Earle C. Williams, Mr. Philip A. Odeen was brought in as president and CEO. He had been serving as vice chairman, Management Consulting Services for Coopers & Lybrand after a lengthy career with the firm's consulting component in Washington, D.C., as a managing partner. One of Mr. Odeen's primary challenges will be to accelerate BDM's diversification into commercial and international markets.

Federal and National Information Systems

By INPUT's definitions of SI, much of what BDM does is not SI but projects that contain some elements of SI. They are included to illustrate the technical capabilities of BDM, which have always been BDM's strength.

The Securities and Exchange Commission (SEC) chose BDM to develop and integrate the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system. On October 31, 1991, BDM completed the first six months of public use of the operational EDGAR system. In this eight-year, $70 million program, BDM is installing the hardware and developing the software that allows public corporations to file documents electroni-

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cally with the SEC, enables SEC analysts to review filed documents on advanced computer workstations, and permits immediate dissemination of information to the investment community. When completed, EDGAR will serve approximately 15,000 public companies, and the SEC has estimated that it will generate cost savings of $170 million.

BDM continues to provide information resource management support to the Department of Veterans Affairs, ranging from cost-benefit analyses to information systems planning. BDM assessed software engineering processes and computer security practices and devised a set of improvements for implementation.

BDM, as engineering support contractor, designed a complex, multimedia communications system to tie together the facilities of the Federal Aviation Administration's (FAA) National Airspace System. Also for the FAA, BDM began design of the Data Multiplexing Network and the Low Density Radio Communications Link and addressed the assignment of channel segments.

BDM continues the development of a comprehensive system to integrate critical information throughout the Strategic Defense Initiative Organization (SDIO) for management of the multibillion-dollar SDI program. The system will link the information systems of government agencies and others involved with SDI.

BDM designed and developed an optical disk-based information system to store all the personnel records and files for the U.S. Army Enlisted Records and Evaluation Center. This pilot project demonstrated the advantages of optical imaging and served as a proof of concept prototype for an Army-wide personnel document management system.

In 1991, BDM successfully completed the rehosting of the computer-based system that processes millions of Department of Defense security clearance records. BDM also developed a functional description and process flow charts for the Defense Investigative Service (DIS) National Computer Center.

For the state of Montana, BDM designed, developed, and implemented advanced information systems called Family Assistance Management System (FAMIS), which increased central control, efficiency, and responsiveness in a variety of critical areas involving delivery and management of public services. Also, to attack the problem of delinquent parents reneging on child support agreements, BDM is developing and integrating an automated program for Montana called "SEARCHS"—System for the Enforcement and Recovery of Child Support.

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BDM also continued and expanded similar efforts for the state of New Mexico's Human Services Department, including mainframe and network services, management of statewide computer and telecommunications operations, and application support for the Integrated Services Delivery System. Since 1988, BDM has assisted New Mexico in developing the largest and most successful electronic benefits transfer (EBT) program in the nation. EBT allows human services program recipients to receive and use their benefits electronically through automatic teller machines and point-of-sale terminals in grocery stores.

For Michigan's Department of Transportation, BDM assisted in the development of an advanced data architecture to provide integrated information in a timely manner and usable format.

Command and Control

In continuation of a joint Defense Nuclear Agency (DNA)/Defense Communications Agency (DCA)/U.S. Pacific Command program, BDM provided computational and communications automation in support of a new mobile command center called the Enhanced crisis Management Capability. BDM's automation support for this mobile command center had its genesis in the Theater Analysis and Planning systems developed for DNA under a variety of corps- and theater-level command and control programs.

BDM continued its support during 1991 as systems integrator for the Army Operations Center upgrade project. The Army Operations Center is the Pentagon facility that coordinates and manages crisis operations.

BDM continued its major role in support of the improvement of our nation's tactical Command, Control, and Communications (C^3) assets by providing test and integration support to the development of the All Source Analysis System; developing and testing software for the U.S. Army's Maneuver Control System; and providing extensive support services to the Joint Tactical Command, Control and Communications Agency.

BDM assisted in the design, development, and evaluation of C^3 systems for the U.S. Transportation Command. The effort expanded in 1991 and included life cycle evaluation of candidate systems, design and logistics studies, and training evaluations.

Strategic, Theater, and Tactical Defense

The comprehensive challenge of being a "Super SETA" (Scientific, Engineering, and Technical Assistance) contractor for the Strategic Defense Initiative Organization (SDIO) required a wide range of BDM's expertise. In 1991, BDM assisted in implementation planning for the

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Global Protection Against Limited Strikes (GPALS) system, SDI's current focus. BDM also supported an SDIO counterforce capability plan, providing detailed threat data, sensor-target intervisibility analysis, and weapon-target interaction analysis for incorporation into SDIO modeling.

BDM helped the U.S. Army Strategic Defense Command strengthen Theater Missile Defense, providing systems engineering and assistance under the Combined Allied Defense Effort, a key element of SDI. BDM also developed active survivability enhancement options for the ground-based elements of the National Missile Defense component on the GPALS mission.

BDM extended the state of the art in interceptor projectile technologies by developing innovative concepts for exoatmospheric projectiles under the Army's Advanced Projectile Interceptor Contract and the High Endo-Exoatmospheric Strapdown Seeker contract. BDM's theater technology expertise provided independent evaluations of "Smart Weapons" technologies and supported another effort in involving armor and anti-armor munitions and the nation's next generation land combat vehicles.

Design Engineering

Under a Design Engineering Program contract with the U.S. Air Force Ogden Air Logistics Center, BDM applied technology to increase the reliability and maintainability of a comprehensive range of Air Force weapon systems. Work initiated or underway in 1991 included development of an automated laser system to remove paint from F-16 radomes manufactured from advanced composite materials; redesign and fabrication of an improved elevator work cage for access to missiles in silos; and modification of the 1960-vintage test set for a missile's explosive set circuitry to ruggedize the missile and reduce its size and weight.

Test and Evaluation (T&E) and Training

In 1991, BDM expanded its support to the Army Operational Test and Evaluation Command and began supporting the Joint Interoperability Test Center (JITC). Large-scale efforts encompassed test design, conduct, and performance assessment of operational systems.

Transportation Analysis and Systems

In support of the Volpe National Transportation Systems Center (VNTSC), BDM began development of a comprehensive information model for the Army and provided support to VNTSC's leading edge INTRANSIT system, calling upon BDM's expertise in systems integration, mapping databases, over-the-horizon tracking, computer security, counter-narcotics, and satellite support.

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Advanced Warehousing and Distribution

In 1991, BDM initiated a strategic alliance with Alpha & Omega Integrated Control Systems, Inc. (A&O), a technological pacesetter in software for the automated distribution marketplace. This alliance opened a promising new marketplace to BDM.

Both Bell Canada and Ciba Geigy chose BDM to be the system integrator for automated warehousing and distribution systems at multiple sites. Each project is valued in multimillion dollars, and BDM's selection in both cases resulted from the innovative solutions offered by the BDM/A&O team and by BDM's own reputation as a systems integrator. The Ciba Geigy award also enhances the company's growing reputation in the important international pharmaceuticals market.

More recently, BDM was chosen to perform warehouse management SI services in the U.S. and abroad for the Business Logistics Services of Federal Express Corporation.

Logistics Systems and Services

The Requirements Data Bank (RDB) program awarded by the U.S. Air Force Logistics Command (AFLC) to BDM in 1984, is the cornerstone of the AFLC's modernization program. This 10-year program, with a potential value exceeding $230 million, involves all aspects of computer/software systems integration.

RDB helps plan and track total Air Force purchase, maintenance, and repair requirements for over one million items, approximately $28 billion of inventory, and 75 major weapon systems. The goal of the RDB effort is to field a logistics tracking system that increases operational readiness and control, reduces budget preparation time, improves strategic planning, and standardizes the spare part requirements process.

In 1991, BDM continued automating the process for managing Air Force logistics requirements and spare parts, with over 2.5 million lines of computer code installed and more than 6,000 users supported on a daily basis. The RDB program received the Logistics Management Systems Center Commander's award for excellence in 1991.

In support of the U.S. Army's comprehensive logistics modernization program, BDM undertook a series of tasks for the Army Strategic Logistics Agency to determine base requirements in transportation and other areas.

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Under the Pacer Frontier program, BDM contributed to enhancing the logistics support infrastructure for the Air Force Logistics Command in support of the Space Command located near Colorado Springs, which is responsible for first alert in case of an attack against North America. The Pacer Frontier program incorporates many proven BDM technologies and includes use of the BDM-developed Software Blueprint℠ and Management Decision Support System.

Air Traffic Control and Airspace Management

This key marketplace was significantly penetrated by BDM in 1991 through the award of two landmark contracts. In the highly competitive Peace Panorama program, BDM was chosen by the U.S. Government to assist in developing an airspace surveillance system for Colombian airspace.

Under the FAA's Automation Bridge research and development effort, BDM is defining and evaluating an air traffic control (ATC) system that is functionally equivalent to the currently installed terminal radar approach control (tracon) systems, using state-of-the-art computer systems and architectures.

During the conduct of several programs, BDM developed a proprietary ATC system that combines proven off-the-shelf computer hardware and BDM-developed applications software. A full range of ATC capabilities can be provided by this system to meet the needs of governmental, commercial, domestic, and international clients requiring a state-of-the-art, turnkey system for advanced airspace management. BDM systems can operate as standalones or be fully integrated into National Airspace System operations.

Airport Security

BDM provided security engineering services to the Detroit Metropolitan/ Wayne County Airport, completing the design of an automated access control system for the air operations area. The system meets strict FAA standards and includes personnel badging, vehicle permitting, door and gate access control, closed circuit television monitoring, and perimeter intrusion detection.

Space Science and Applications

BDM greatly expanded its space activities in 1991. The company was selected by NASA to provide engineering, scientific, and program support for the Earth Observing System (EOS), the primary element in NASA's "Mission to Planet Earth" program. Winning a recompetition of NASA's Astrophysics Division support contract further confirmed BDM's role in

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helping advance space science and applications, as BDM scientists and astrophysicists continued their work with NASA on the great Observatories program—four, billion-dollar satellites that will observe the universe in complementary spectral regions.

BDM also continued its support of the Space Station Freedom program, evaluating science and commercial utilization requirements for the space station and coordinating with NASA field centers, other federal agencies, and international teaming partners. Although NASA Headquarters was BDM's principal client, the company's assistance to NASA also encompassed activities for individual NASA offices and centers.

Advanced Manufacturing Systems

BDM's work on the SEMATECH Semiconductor Generic Manufacturing Model was expanded to include development of next-generation Distributed Factory System prototypes and a survey of state-of-the-industry wafer fabrication equipment controllers.

BDM supports modernization initiatives in the areas of enterprise integration technology, concurrent engineering, information resources management, and the application of systems development methodology and product life cycles to support systems and software development programs. This work includes enterprise analysis, systems development projects, technology transfer, tutorials, and training seminars for manufacturing firms.

For several large clients, BDM completed the design, development, and installation of automated production line equipment and customized control system software. BDM also provided related training and long-term maintenance.

Information and Telecommunications Systems

In 1991, BDM initiated a corporate thrust to become a major provider of services to law firms, corporate and governmental legal departments, and state, local, and federal judiciary systems. The company was selected by a major Washington, D.C.-based law firm to be its systems integrator on a nearly $2 million information system replacement project.

BDM completed a planning study for the World Bank, postulating a future electronic communications environment with integrated voice, image, graphic, and textual data. BDM also developed specific recommendations for migrating the Bank's current telex, facsimile, and electronic mail services toward that goal.

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3. Company Competitive Position

Approximately 90% of BDM's 1991 revenue was derived from the U.S. government, including subcontracts (67% from the DoD and 23% from other government agencies), 3% from foreign government clients (including services to foreign governments through the U.S. government), and 7% from commercial and other clients.

Approximately 97% of BDM's 1991 revenue was from the U.S. and 3% from international sources.

BDM is the prime SI contractor 60% and the subcontractor 10% of the time. It supports SI contracts managed by the client 30% of the time. Thus, BDM is either the prime contractor or offering professional services for most of its SI engagements.

Exhibit BDM-3 shows the level of relative margins that BDM realizes from SI components.

EXHIBIT BDM-3

Level of Relative Margins Realized from SI Components

Integration Component	Level
Standard hardware and software	L
Customized hardware and software	M
Software packages	L
Consulting/design/integration	H
Custom software development	M
Project management	M
Training and education	M
Post-installation operations	M

H=High M=Medium L=Low

BDM's markets, which are largely in the continental U.S., are served through a network of operations centers, site facilities within or near client operations, and other offices supporting regional and local client bases.

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- The largest BDM operations are located in McLean (VA), Albuquerque (NM), Columbia (MD), Dayton (OH), Germantown (MD), Huntsville (AL), and Riyadh, Saudi Arabia.

- BDM has an additional 45 offices worldwide.

A range of mainframe, minicomputer, and microcomputer systems; networks; and workstations assist BDM in providing professional services and support to its clients.

- Large-scale DEC VAX and IBM systems are located at several major BDM sites, networked and accessed through a variety of leased lines and dial-up links. Remote access is provided via terminal or microcomputer.

- IBM communication software controls BDM's network of more than 1,000 terminals and workstations, composed of local-area networks (LANs) that are bridge at each main technology center to a wide-area network (WAN). Gateways perform protocol conversions, which allow all LAN workstations connectivity into the IBM and/or VAX mainframes.

4. Markets Served

INPUT expects the new leadership at BDM International, with BDM's new corporate structure and its focus on developing non-DoD and commercial opportunities, to discover new markets for BDM. BDM's current markets are shown in Exhibit BDM-4.

EXHIBIT BDM-4

Vertical Markets Served by BDM

- Education
- Federal Government
- Logistics
- Manufacturing
- Public Policy
- State/Local Government
- Transportation
- Wholesale/Distribution

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5. Recent Events of Interest

In May 1992, Philip Odeen, a Coopers & Lybrand executive became president and CEO succeeding Earle C. Williams. Mr. Odeen was vice chairman of management consulting services at Coopers & Lybrand's New York office. Before that, he ran the accounting and consulting firm's Washington, D.C.-based federal consulting business. This is a significant change of leadership because Mr. Williams had almost become synonymous with BDM over the years.

BDM was awarded a four-year, $17 million contract to design and install an operations control center to provide the Washington Metropolitan Area Transit Authority (WMATA) with a state-of-the-art capability to monitor, supervise, and control rail, maintenance, security, and passenger operations. BDM initiated development on the control center, including a large-scale projection display system to monitor rail operations and a programmer/engineer/training facility to simulate rail operations and play back historic incident data in real-time simulation.

On March 13, 1992, BDM Holdings, Inc. announced the acquisition of Vinnell Corporation. Vinnell operates as a wholly owned subsidiary of BDM Holdings. Vinnell is a $100 million professional and technical services company.

In early 1992, BDM regained its prominence in the test-and-evaluation market by winning a $116.6 million contract from the Defense Information Systems Agency (DISA) Joint Interoperability Test Center (JITC). The contract has a two-year base and three one-year extensions. BDM will plan and conduct tests on the interoperability of tactical and strategic command, control, communications, and intelligence systems used in joint or combined military operations. The company will also support JITC in operational tests and evaluations of large-scale information management systems.

On July 15, 1992, SEC's EDGAR became operational as the system began accepting live filings, electronically, following a successful test period. The government has estimated that the total system costs will be $75 million, up from the original 1989 award of $51.5 million. Mandatory EDGAR filings are not expected to start until next spring. Some of the system's cost to the government will be offset by revenue generated by commercial use of the data.

6. SI Organization

Like many large DoD aerospace firms, BDM has matrixed SI activity. SI is an opportunistic activity that is applied where necessary to win programs.

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BDM has been in the system integration business for 15 years. BDM believes it is strong in the core capabilities of technology expertise and client relationships. BDM feels that it is almost as strong in the ability to manage risk, project management skills, and vertical industry expertise. BDM is in SI primarily because of expected revenues and profits and being able to respond to customer demand. Secondarily, the company is in SI because of the opportunity to win follow-on facilities management contracts and the strength that it can give to follow-on non-SI business.

Because BDM has a matrixed organization, the responsibilities and activities required to manage and execute an SI contract are also matrixed. Exhibit BDM-5 shows the organization's approach to responsibilities.

EXHIBIT BDM-5

BDM's Approach to SI Responsibilities

Responsibilities	Commercial	Federal
Strategy and long-range planning	B	D
Marketing and promotion	B	D
Account management/sales	B	B
Contract review/approval	C	C
Project management/control	D	D
Implementation/development	D	D
Hardware/software acquisition	B	B
Systems operation	C	C

A=Centralized B=Both C=Decentralized

7. SI Business Objectives

As BDM enters its second full year as an independent company, its focus is to reestablish the pattern of growth that was so evident during the 1970s through 1986. The growth of a professional services firm is achieved by the successful passage through a gateway from one level of business activity to a higher level. This is being accomplished through one of five steps, termed *gateways* by BDM. BDM gateways are listed in Exhibit BDM-6.

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EXHIBIT BDM-6

BDM Gateways

- **GATEWAY 1—Building of Basics, Responding to Change:** This Gateway is characterized by the combination of a long history of BDM work in a given area with our flexibility to respond to changing market conditions.
- **GATEWAY 2—Major Growth, Current Clients:** In this Gateway, the legacy of providing quality service to a specific client results in an abundance of opportunity for substantial growth.
- **GATEWAY 3—Major Wins, Major Markets:** This Gateway is characterized by the successful winning of a major contract that generates tens of millions of dollars per year in revenue.
- **GATEWAY 4—Key Market Penetration:** In this Gateway a key contract, in a new area of endeavor, provides the opportunity for an entire new business area in BDM.
- **GATEWAY 5—Strategic Alliances and Investments:** This Gateway results from the synergistic combination of BDM skills and experience with a complementary set of skills possessed by another firm.

Source: BDM Corporation

In the SI market, BDM is targeting vertical markets. Its primary targets include the distribution/warehousing, manufacturing, transportation (air traffic control and transit control), and legal industries. The selection criteria for the SI target markets are strategic directions, probability of win, fit with BDM capabilities, and profit potential.

In terms of annual revenue from federal business, approximately 50% is derived from new contracts (80% of which resulted from responding to RFPs) and 50% from additions and modifications to existing business. BDM's aggressiveness in the commercial SI market is shown by the fact that 35% of its commercial SI revenue comes from responding to RFPs, 25% from focused marketing, and 25% from trade advertising, whereas only 15% comes from leveraging existing clients.

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In summary, BDM is positioning itself in the commercial SI market emphasizing quality solutions tailored to clients at affordable costs.

8. SI Capabilities Evaluation

SI is a business offering that provides a complete solution to an information system, networking, or automation requirement through the custom selection and implementation of a variety of information systems products and services. A systems integrator is responsible for the overall management of a SI contract and is the single point of contact and responsibility to the buyer for the delivery of the specified system function, on schedule and at the contract price. To be included in the information services market, SI must involve some application development component. In addition, the majority of the cost must be associated with information systems products and/or services.

Exhibit BDM-7 lists the primary capabilities required to deliver systems integration. In the table, the first column indicates the capability exists in-house, the second column indicates the strength of that capability in-house, and the third column indicates if BDM commonly uses alliances for that capability.

9. SI Strategic Alliances

In general, BDM has no formal program with respect to alliances. Most alliances are formed on a contract-by-contract basis. BDM has OEM and VAR agreements with most major hardware and software vendors. The one long-term alliance is discussed next.

In mid-1990, BDM initiated a new thrust in its systems integration business area, focusing on warehouse and distribution system automation. One of the initial steps taken was a survey and assessment of the wide variety of commercially available software packages that promise to automate various warehousing functions. BDM discovered that in one area—warehouse distribution systems—one vendor's software package appeared to be far superior to any other. This vendor is Alpha & Omega Integrated Control Systems, Inc. (A&O), located in suburban Pittsburgh (PA). BDM decided to subcontract a portion of its first bid in the distribution system automation area to A&O. Thus began a relationship that has proved beneficial to both companies.

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EXHIBIT BDM-7

BDM Primary SI Capabilities

Capability	Exists (Y/N)	Strength (H/M/L)	Sub-contractors (Y/N)
Business consulting	Y	L	Y
Design methodology	Y	H	N
Design/integration	Y	H	N
Project management	Y	H	N
Software development	Y	H	Y
Education/training/ documentation	Y	M	Y
Packages applications software	Y	M	N
Packaged systems software	N	N/A	Y
Standard computer hardware	N	N/A	Y
Custom computer hardware	N	N/A	Y

A&O is a small but growing firm specializing in designing and implementing state-of-the-art systems for distribution system automation. The service that A&O provides includes design and engineering support to tailor its proprietary software product—called DOMS™ (the Distribution Operations Management System™)—to the specific needs of the particular client.

10. SI Capabilities Summary

BDM has several capabilities that give it an advantage over the competition. For projects involving CASE and design methodology, BDM has both Software Blueprints^{SM} and its software productivity enhancement centers (SPEC^{SM}). For warehouse management it has the industry-spe-

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cific software called DOMS™. BDM uses its unique strengths in hardware and software for airspace management and air traffic control and software systems. For enterprises analysis, it has strengths in IDEF and information architecture development methodology.

11. SI Marketing Strategy

BDM uses only trade and industry advertising, word of mouth, and trade shows to promote its SI services; word of mouth and trade shows are more effective than advertising because of the diversity and breadth of BDM's operations and markets. BDM has a host of competitors but no principal competitor. Once BDM establishes marketing strategies under its new president and CEO, Philip A. Odeen, principal competitors may be more apparent.

12. SI Customer Base

Exhibit BDM-8 list principal customers, value/duration of project, and project description.

13. Summary and Future Directions

BDM has purchased itself from Ford and has installed a new president. One of the president's new challenges is to accelerate BDM's diversification into commercial business. With only 7% of BDM's 1991 revenue coming from commercial sources, most of BDM is still attuned to the federal market.

BDM is positioning itself to be responsive to clients that desire open systems. This increasing reliance on open systems will continue to cover the cost of hardware to the end user and will make it much more difficult to use hardware to generate generous margins. BDM will benefit as outsourcing continues to be corporate stratagem for reducing costs and for improving information systems for global competitiveness.

INPUT believes that BDM has the potential to be successful in commercial SI. BDM's technical reputation as well as its efforts in manufacturing and distribution will give it some early clients. It is too early to predict if BDM will be as successful in commercial SI as it has been in federal SI and professional services.

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EXHIBIT BDM-8

BDM's Principal Customers and Products

Customer	U. S. Air Force
Value/Duration	$230M, 10 years
Project	System design, development, and integration of Requirements Data Bank (RDB) program
Customer	Securities and Exchange Commission
Value/Duration	$70M, 8 years
Project	Design, development, and integration of Electronic Data Gathering and Retrieval System (EDGAR)
Customer	State of New Mexico
Value/Duration	$23M, 4 years
Project	Systems design, development , and integration services for Human Services Department
Customer	State of Montana
Value/Duration	$15.9M, 5 years
Project	Development and installation of state information system to support public assistance programs
Customer	Washington Metropolitan Area Transit Authority
Value/Duration	$17M, 4 years
Project	Design and installation of operations control center
Customer	Bell Canada
Value/Duration	$4M, 2 years
Project	Warehouse control systems integration

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COMPANY PROFILE

Boeing Computer Services

1. Key SI Contacts

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Bellevue, WA 98008

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Vice President/Deputy Manager
Information Services
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Bellevue, WA 98008

R.M. Little
Vice President/Deputy Manager
Information Services
10800 Parkridge Boulevard
Reston, VA 22091-5418

Federal

George Coulbourn
General Manager
Government Business Development
10800 Parkridge Boulevard
Reston, VA 22091-5418

Commercial

Doug Smith
General Manager
Commercial Information Services
2810 160th Avenue, S.E.
Bellevue, WA 98008

2. Description of Principal Business

Boeing Computer Services (BCS), a division of the Boeing Company, supplies computing and communication resources and information services to all Boeing operating divisions, and to more than 1,500 government and commercial customers worldwide.

BCS was established in May 1970 to consolidate 13 separate computing organizations within Boeing. The division began with about $250 million worth of computing equipment and a staff of 2,700.

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Today, BCS employs more than 13,000 people located throughout the U.S. and other countries, and manages approximately $1.4 billion worth of company-owned computing and telecommunications equipment.

BCS is currently divided into two major groups:

- Information Services—BCS' current noncaptive business focuses on providing strategic systems development and integration products and services to government and commercial clients. The division also provides network integration and management products and services, document and image management products and services, remote computing services (including supercomputing), systems operations services, consulting services, packaged software products, and education and training services.

- Boeing Support Group—Over $1.1 billion in information services support is supplied annually to the Boeing Company and its operating divisions by the Boeing Support Group (BSG). The Advanced Technology Center, which has been a pioneer in areas such as artificial intelligence and supercomputing, is also managed by BSG.

In 1989, BCS realized significant revenues from its systems integration (SI) business, focused mainly on the federal market, as shown in Exhibit BCS-1. The company also positioned itself in the commercial SI market. BCS' 1989 noncaptive revenue is estimated at approximately $360 million, a 30% increase over estimated 1988 noncaptive revenue of $275 million.

EXHIBIT BCS-1

BCS
Systems Integration Revenues, 1989

Business Component	$ Millions*
Federal	215
Commercial	35

*Estimated

3. Competitive Position

Boeing Computer Services has significant strength in a number of areas that include systems and network design, integration, and management. One of BCS' key strengths is its ability to draw upon a highly technical staff of approximately 13,000. Areas of technical specialization include:

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- Systems design, integration, and management
- Network design, integration, and management
- Document management
- Image processing
- Artificial intelligence
- Supercomputing
- Facilities management and systems operation
- Program planning, management, and control
- Education and training

As a provider of SI services, BCS has a strong computer services base and a broad base of skills from which to draw. See Exhibit BCS-2. BCS is also strong in applied research, such as the application of artificial intelligence. BCS is able to demonstrate many of these skills through its Telecommunications Management Center, data centers, and nationwide networks.

EXHIBIT BCS-2

BCS Strengths and Weaknesses

Strengths

- Broad computer services base
- Broad network services base
- Broad skills base
- Strong project management base
- Strong applied research

Weaknesses

- Historical federal focus
- Historical parent company focus

Early in its history, BCS became a major player in the commercial timesharing market. Next, the company placed emphasis on becoming a major participant in the federal integration programs arena, while at the same time deemphasizing its interest in the commercial marketplace. Reorganization of the division in 1989 has shifted resources to building the commercial systems integration business into a major contributing

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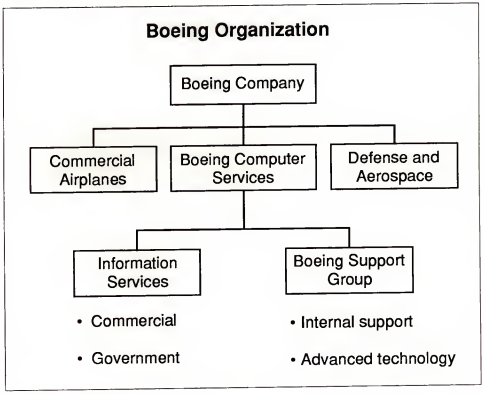
entity. To date, BCS' commercial activity has been limited to key vertical market niches such as aerospace and state and local government. However, the company has recently branched out into new areas, including transportation, electronics, and utilities.

The president of BCS has always reported directly to the president of Boeing. A 1989 reorganization of the defense and aerospace businesses within Boeing reduced the number of executives who report directly to the Boeing president. The current Boeing organizational structure in shown in Exhibit BCS-3. This structure allows the BCS division even more visibility within the corporate structure and shows the high-level strategic importance of BCS, both internally within Boeing and externally as a commercial enterprise.

EXHIBIT BCS-3



4. Markets Served

Approximately 85% of BCS' 1989 noncaptive revenue was derived from the federal government, and 15% from commercial clients. Noncaptive revenue excludes that derived from the parent company, which is BCS' principal customer. Within the government, BCS pursues business—including SI, support services, and telecommunications business—for the Department of Defense, NASA, and various civilian agencies. Commercial revenue comes primarily from the manufacturing, energy, and transportation industries, state and local government, and from cross-industry applications. New vertical markets, including pharmaceuticals, financial services, and electronics, are evaluated in response to market demand.

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BCS operates six major data centers. Four of the data centers—Kent, WA; Wichita, KS; Philadelphia, PA; and Huntsville, AL—principally support Boeing operations at those locations. The fifth, located in Bellevue, WA, supports both Boeing and commercial customers, and the sixth, in Vienna, VA, serves the federal government. All centers and offices are linked by one of the largest privately owned telecommunications networks in the world.

5. Recent Events

To build on its success in the federal market and to increase federal business, Boeing has expanded its Vienna, VA headquarters and added 12 additional executive positions. While the additional building is being constructed, BCS has temporarily leased additional office space in nearby Reston, VA. BCS is currently pursuing two major SI contracts:

- HUD's Integrated Information Processing Services (HIIPS)
- The Department of State Telecommunications Network (DOSTN)

In a move to increase its penetration of the European market, BCS has signed a new distribution agreement with GEC, England's largest engineering and electronics company. The agreement covers BCS' Product and Process Document Management (PPDM) software. Tandem Computers is also a participant in the arrangement.

BCS also recently won a contract to maintain the Commonwealth of Pennsylvania's data communications network. The three-year contract was awarded through a recompetition of an earlier contract won by Boeing, which included the design and implementation of the multiagency state network.

6. SI Organization and Staffing

Exhibit BCS-3 illustrates the Boeing organization. BCS is divided into two major groups: the Information Services group, which handles systems integration for external customers and is further divided into Government Business Development and Commercial Information Services; and the Boeing Support Group, which handles systems integration for the Boeing Company.

The Information Services group provides strategic systems development and integration products and services to government and commercial clients. The division also provides network integration and management products and services, document and image management products and services, remote computing services (including supercomputing), systems operations services, consulting services, packaged software products, and education and training services. Approximately 3,000 employees are active in this group, and further resources are drawn from the Boeing Support Group and other Boeing divisions.

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Over 7,000 employees in the Boeing Support Group directly support the computing and telecommunications needs of the Boeing Company and its operating divisions. The Advanced Technology Center, which performs research in areas including artificial intelligence, software engineering, and high-speed processing, is part of the Boeing Support Group.

7. SI Business Objectives

INPUT believes that BCS' strategic direction will be closely aligned with its areas of strength. Specific emphasis will be placed on opportunities requiring extensive systems and network integration, large computing facilities, and highly sophisticated, high-speed systems. The company will support these services by developing integration tools in areas such as network management and document/image management.

In shifting its attention from its traditional business areas, BCS has taken several steps:

- BCS has refocused its concentration from timesharing (a flat business) to systems integration, network integration, network management systems, document management systems, systems operations, and other areas of strategic importance to customers' businesses.
- BCS is emphasizing a value-added systems integration approach that also serves as an umbrella for its other products and services.
- BCS is focusing its software development efforts on value-added integration and management software that is not currently available in the marketplace—for example, the Product and Process Document Management (PPDM) software and the Integrated Network Management System (INMS) software.
- BCS is developing key alliances in product development and marketing with hardware vendors, telecommunications carriers, and consultants.
- BCS has instituted organizational changes to increase the visibility of the Information Services group within the company and to facilitate expansion into new markets.
- BCS has realigned its commercial systems integration activities to pursue and penetrate this growing market.

8. SI Capabilities Summary

Boeing's capabilities lie primarily in systems and network management and integration, systems operations, project management, and computer services. As a systems integrator for the Boeing Company, BCS has designed and implemented the Boeing Telecommunications Management Center (TMC).

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In late 1987, Boeing had five network control centers. Today, they are all consolidated in one centralized, real-time network management center. During 1989, the TMC monitored 17 complex networks, 13 major sites, 4,000 data circuits, 30 strategic switches, 110,000 switched lines, and 11,900 interconnect trunks. BCS is also completing a $100 million modernization of Boeing's nationwide private voice network.

BCS' array of proprietary software products also increases its ability to capture SI work. For example, the Boeing Integrated Network Management System (INMS) caters to the varying technologies of many different vendors, so customers can use INMS with their existing baseline equipment as well as with new equipment. The Boeing Product and Process Document Management System (PPDM) can serve as a base for complex systems integration and management that includes large-scale image processing. Boeing's Contract Management Family includes proposal pricing, project management, estimating, scheduling and program history components, and also supplies the Executive Information Services (EIS) application development language tool. The company's line of scientific and engineering software also supplies customers with tools that enhance their system capabilities.

Boeing also remains active in traditional timesharing and supercomputer services. The company's MAINSTREAM Access services offer scientific and engineering customers a broad range of computing capabilities, including CRAY XMP/24 supercomputing processing, CDC CYBER and IBM systems processing, and gateway access service. These services are supplied through Boeing's data centers in Vienna, VA and Bellevue, WA. BCS also provides customers with facilities management services.

BCS strengths include requirements analysis and definition, systems architecture and design, facilities planning and management, network design and management, education and training, and project management.

9. SI Capabilities Evaluation

BCS has extensive capabilities dispersed throughout its organization. A 1989 reorganization resulted in a staff dedicated solely to commercial systems integration opportunities. This indicates the company's serious intent to establish a strong presence in the commercial systems integration market.

a. Consulting/User Requirements Analysis

BCS has strong technical and project management skills in consulting, particularly in the design and use of supercomputers, the design and management of large data center operations and networks, the management of documents, and the integration of manufacturing systems. The

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company does not bill itself as a business or management consulting firm per se, but it does provide these services as part of a total systems integration assignment.

b. Design/Integration

BCS has excellent skills in the design and integration of complex systems, including centralized and decentralized information processing as well as telecommunications that serve a large number of geographically dispersed users. Boeing's base of computer and telecommunications equipment is quite diverse. In 1989 the company had approximately 84,000 computer workstations, 500 minicomptuers, and 50 mainframes running on a multitude of local- and wide-area networks. The Boeing communications network is monitored through a central Telecommunications Management Center (TMC) that encompasses 17 complex networks and 13 major sites.

c. Project Management

BCS has developed a proprietary project management system that is comprehensive and is geared to large, complex projects. The Boeing Company's success in the commercial airplane business is due in large part to its skills in complex project management.

d. IS Hardware

BCS neither develops nor manufactures IS equipment. Over the years the company has worked with a multitude of vendors and has developed methods to objectively screen and select the best vendor for a particular job. Few organizations are able to work as successfully with large systems as BCS. BCS has developed extensive skills and expertise in implementing both mainframe-based systems and complex distributed networks.

e. Communications Hardware

While not a manufacturer of communications equipment, BCS has a solid base of knowledge in its application. The company has worked with a multitude of vendors and has developed methods to objectively screen and select the best vendor for a particular job. The company has developed and managed extensive networks both internally and for clients.

f. Software Development

BCS has a broad skill base and wide experience in software development. The company's present emphasis is on software that adds value to its systems and network integration work. Examples include the Inte-

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grated Network Management System (INMS) and the Product and Process Document Management System (PPDM). The company also continues to market specialized engineering and scientific applications and contract management software.

g. Application Software

As noted in the previous section, BCS develops application software that adds value to its systems and network integration work.

h. Systems Software

BCS has a broad base of skills to develop systems software and has developed such software for use in its remote processing environment. It does not currently develop and market packaged systems software for use on client systems.

i. Education, Training, Documentation

BCS has strong skills in education and training, with a large organization dedicated to providing training services for Boeing staff and as a commercial offering. In addition to packaged courses, BCS will design courses to meet specific client needs.

j. Service and Repair

BCS provides service and repair to the corporation. As part of a systems integration and operations project, BCS will manage maintenance services for clients.

10. SI Strategic Alliances

Several recent strategic alliances, summarized in Exhibit BCS-4, are indicative of BCS' short- and long-term focus.

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EXHIBIT BCS-4

BCS Strategic Alliances

Vendor	Purpose
Tandem Computers	Document management software
NEC	Integration Network Management Software (INMS)
IBM	SI partner
U.S. West	Network integration partner
Honeywell	High-speed circuitry and supercomputer development
Scientific Computer Systems	Operating systems software

- Through an alliance with Tandem Computers, Inc., BCS is developing a strategic document management product (Product and Process Document Management System—PPDM) that will run on the Tandem platform. Target markets include manufacturing and pharmaceuticals, as well as other vertical markets where Tandem or Boeing have strength, including transportation, finance, and utilities. The Boeing PPDM software will be marketed by the Tandem sales organization.

- A distribution agreement with GEC, the U.K.'s largest engineering and electronics company, for Boeing's PPDM software was recently signed. The contract is a three-way agreement between Boeing, Tandem Computers Inc., and GEC Computer Services, a division of GEC, which will have sublicensing rights to sell PPDM within its parent corporation. GEC will also have the right to sell the English language version of PPDM, either directly or through agents, to the European Economic Community.

- Through an alliance with NEC, network management software is being developed that provides interfaces to NEC's telecom products. Under the terms of the nonexclusive agreement, Boeing will retain all rights to its network management software. The software will be provided to NEC in addition to documentation, maintenance, and consulting support. NEC will combine the Boeing software with its own NEAX 2400-IMS PBX products under the name VISION Integrated Network Management System (VISION-NMS) and will market the product to corporations in the United States and Australia.

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- BCS also has an alliance with IBM for joint bids on projects where BCS can add value in systems and network management and integration. IBM was a subcontractor to Boeing on a contract to design and implement a data communications network for New York City.

- BCS has a memorandum of understanding with US West Communications that formalizes a strategic alliance between the two firms to provide network integration services to medium- to large-sized business throughout the 14 states serviced by US West.

- An alliance with Honeywell will provide access to Very-High-Speed Integrated Circuit (VHSIC) technology for specialized applications.

- BCS has an agreement with Scientific Computer Systems to provide operating system software for the SCS-40 near-supercomputer.

11. SI Marketing Strategy

INPUT believes that BCS will place increased emphasis on integration projects that are of high value (over $5 million) and that have a requirement for complex computing and network systems. This will enable it to leverage its strengths. BCS has significant strength in a number of areas that include systems and network design, and integration and management of large, complex projects. Systems integration will serve as an umbrella under which will be marketed value-added tools, products, and services such as the Integrated Network Management Software (INMS) and the Product and Process Document Management System (PPDM).

The company will round out its expertise in technology, project management, and systems/network management and integration by utilizing a wide range of development and marketing teaming and alliance partners, including computer/telecommunications hardware manufacturers, telecommunications manufacturers and carriers, and consultants.

Boeing will target vertical markets including manufacturing, utilities, transportation, pharmaceuticals, and federal, state and local governments, as well as other vertical market opportunities that are identified by alliance partners.

Exhibit BCS-5 summarizes BCS' approach.

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EXHIBIT BCS-5

BCS Marketing Strategy

- Target industries
  - Federal
  - Manufacturing
  - Telecommunications
  - State and local government
  - Transportation
  - Pharmaceuticals
  - Others as identified by alliance partners
- Target cross-industry markets
  - Systems management and operations
  - Network management and integration
  - Document management/image processing
- Large project focus
- Focus on teaming and alliances

12. SI Customer Base/Specific Projects

During 1988, BCS was awarded the following contracts:

- In December 1988, it was announced that BCS and AT&T Federal Systems Division had won a ten-year federal telecommunications system (FTS 2000) contract for the General Services Administration (GSA) to upgrade the entire federal government telephone system to a digital voice, data, and video communication network. The new system will serve about 1.3 million federal government employees in about 3,500 locations throughout the U.S., Puerto Rico, and the U.S. Virgin Islands.

- BCS won a contract to design and implement a data communications network for New York City. The network will streamline and reduce the costs of the city's information services. BCS will install, test, and maintain the network, as well as provide network management training to users. IBM is a subcontractor to BCS on this project.

- In July 1988, BCS was awarded a five-year contract from the Department of Labor's Bureau of Labor Statistics to provide networking, remote computing services, technical support, and training.

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- In June 1988, BCS was awarded a contract by the Internal Revenue Service to provide remote computing and technical support for several computer-based systems, including the Budget Preparation System and the Inventory Control and Distribution System, used to design, print, distribute, and stock all federal income tax forms.

- BCS, teamed with Booz-Allen & Hamilton, was selected to provide the U.S. Army Intelligence Agency with supercomputing architecture support. The BCS team will install additional computing equipment and networking, and will provide systems support. The team also will develop intelligence modeling tools and application software for the Army.

Other contracts include the following:

- Boeing implemented a $38 million supercomputer network for the State of Alabama. In its first year of operation, the system achieved an 80% usage rate, with most customers coming from business and academia. This experience strengthened BCS' qualifications to bid on other SI projects that involve supercomputers.

- During 1987, BCS was selected to provide the Technical and Management Information System for NASA's space station program. This contract includes the design and implementation of an evolutionary engineering data base system that will operate with NASA Centers, contractors, and eventually other governments as the space station is developed and implemented. This program will add to BCS' list of strong technical credentials.

- Also during 1987, BCS was awarded an eight-year contract from the U.S. Army Forces Command to design and install a management information system for its headquarters operations at Fort McPherson near Atlanta, GA. BCS will integrate the new system with existing Army computer systems and provide local-area networks, 1,200 workstations, and training services.

- BCS has designed, installed, and is operating a nationwide telecommunications network for NASA. This integrated network provides voice, data, facsimile, and full-motion video capabilities.

13. Summary and Future Directions

BCS has various strengths and weaknesses, some of which are summarized in Exhibit BCS-6. It has shown particular expertise in those disciplines related to high technology and network management and integration, including:

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- Systems design, integration, and management
- Network design, integration, and management
- Document management
- Image processing
- Artificial intelligence
- Supercomputing
- Facilities management and systems operation
- Program planning, management, and control
- Education and training

EXHIBIT BCS-6

BCS Summary

Capabilities

- Extensive technical expertise
- Broad range of skills and resources
- Extensive project management expertise
- Strong teaming and alliance relationships
- Strong reputation in federal marketplace
- Ability to handle large projects

Limitations

- Federal/internal orientation reputation
- Limited commercial track record
- Limited business consulting capabilities

Generally, BCS has demonstrated excellent results in dealing with the government sector and has begun to achieve success with the private sector. The limitations it must overcome include:

- BCS does not currently have a strongly developed image in the private sector. It is frequently viewed as oriented primarily to government high-technology environments. BCS has, to some extent, struggled with its commercial business, as it has attempted to eliminate its federally- and internally-oriented image. It will need to continue to focus on convincing customers that it has a long-term commitment to the commercial information services business. Recent company reorganization has strengthened the visibility of commercial business within Boeing and BCS.

- While BCS has strong technical consulting skills in focused areas, it is limited in general business consulting capabilities.

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- BCS, like other vendors with strong federal backgrounds, must focus on transforming its contracting, management, and pricing practices to meet the requirements of commercial customers. This is not an easy transition for a firm with a strong federal heritage.

INPUT believes that BCS will place its primary efforts on leveraging the technological and program management disciplines it has developed through implementing its federal government business and applying those skills in key vertical markets such as manufacturing and state and local government. BCS will be opportunistic in looking, often with alliance partners, for large contracts that utilize its systems and telecommunications development and management expertise.

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COMPANY PROFILE

Bull HN Information Systems, Inc.

1. Key SI Contacts

Ron Cuneo [Federal SI]
President/Chief Executive Officer
Technical Services Operation
U.S. Marketing Sales and Services
Bull HN Information Systems, Inc.
Technology Park
Billerica, Massachusetts 01821-4199

David Herter [Commercial SI]
Vice President
Technical Services Operation
U.S. Marketing Sales and Services
Bull HN Information Systems, Inc.
Technology Park
Billerica, Massachusetts 01821-4199

2. Description of Principal Business

Groupe Bull is a major European ADP equipment manufacturer, known worldwide as a vendor of information processing equipment and services. The U.S. Marketing Sales and Services organization, Bull HN Information Systems, Inc. (Bull) is the former Honeywell computer company. As Honeywell, Inc., it was well known for its computer and communications equipment and processing services, and for its professional/technical services. The current U.S. organization, although wholly owned by the French Groupe Bull, has been chartered with independent American management; thus, it can properly be included in restricted "buy American" procurements with Groupe Bull participating in its profits.

As an SI services vendor, Bull offers a complete range of products and services required to be a full-service SI vendor. Seeking primarily functional markets, coupled with selected industry targets, Bull's key offerings center on UNIX-based distributed processing systems and on-line transaction processing systems.

Bull (and before it, the original Honeywell corporation) has competed in the SI marketplace for more than 15 years. Like most of its competition, however, Bull did not address SI as a separate discipline and market until the market demanded it.

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Current (1990) revenue for Groupe Bull's systems integration activities, exclusive of the Honeywell Federal Systems, Inc. revenue, is $150 million. Its SI business currently is split evenly between mainframe-based system and distributed systems; its current SI contract values break out as shown in Exhibit BUL-1.

EXHIBIT BUL-1

Distribution of SI Contract Values at Bull

Component	Percent of Contract Value	
	Commercial	Federal
Equipment	50	60
Packaged Software	20	20
Professional Services	30	20

3. Competitive Position

Bull gains major advantage from being recognized as a worldwide provider of a full set of SI products and services. Bull has built a reputation as a provider of quality products and services contributing to customer satisfaction.

Clearly deciding to be a full-service SI services vendor, Bull offers all the requisite SI capabilities that INPUT has defined as the base set of SI capabilities. In addition, Bull uses alliances in nearly every area to strengthen both its capability and its responsiveness to its customers.

4. Markets Served

Bull's principal targets (70%) in the SI market are functional; it also pursues selected vertical market targets (30%), as shown in Exhibit BUL-2.

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EXHIBIT BUL-2

Bull's SI Target Market Opportunities

Vertical	Functional
Government (federal/state/local)	Networking
Retail and distribution	Multimedia
Financial services	Transaction processing
Manufacturing	Open systems—UNIX/OSF Workstations/work groups

5. Recent Events

Groupe Bull S.A. recently announced a massive international reorganization that includes stepped-up research and development efforts to unify the company's proprietary and UNIX platforms. The project, which had been targeted for completion in four years, is now on an accelerated schedule of two years, said Groupe Bull Chairman Francis Lorentz. Groupe Bull's R&D worldwide will be centrally budgeted and directed by Bull HN President and Chief Executive Roland Pampel.

Bull's recent introduction of its DPX/Prostation line of UNIX/486-based workstations is typical of the integration direction Groupe Bull is taking. DPX/Prostation is configured with the Bull Professional Environment (BPE), a complete desktop environment of applications and tools. Bull worked closely with the leading desktop operating system company, Santa Cruz Operation, and select applications developers—including Informix Software, Inc., Ingres Corp., and Frame Technologies—to create a fully functional system. "Bull intentionally went to these vendors because customers want popular third-party applications," said a company spokesman.

In January 1991, Bull HN Information Systems, Inc. was awarded a blanket contract by the Commonwealth of Massachusetts for the Superior Court, Department of the Trial Court of the Commonwealth, to provide computer systems to automate the Court's civil and criminal case management procedures.

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In August 1990, Groupe Bull purchased Honeywell Federal Systems, Inc. (HFSI) from Honeywell, Inc. The HFSI operation, based in McLean, VA, has about 1,600 employees and did $274 million worth of business during 1989. HFSI, now essentially a subsidiary of Groupe Bull, would be required by regulations governing foreign-owned companies to run the HFSI operation under a proxy arrangement, since the unit gets about 70% of its revenues from the Defense Department.

6. SI Organization

Bull's overall SI organization is headed by Ron Cuneo, President, Bull HN Information Systems. He is also responsible for the SI activities in the federal market. David Herter, Vice President of Technical Services Operations, heads Bull's commercial SI activities. The organization of Bull's SI activities is matrixed; this is to be expected in a major manufacturing organization like Bull. The division of SI responsibilities at Bull is summarized in Exhibit BUL-3.

EXHIBIT BUL-3

Centralization/Decentralization of SI Business Functions at Bull

Responsibility	Commercial	Federal
Strategy and long-range planning	C	C
Marketing and promotion	C	C
Account management and sales	D	B
Contract review and approval	C	C
Project management and control	B	B
Implementation and development	B	B
Hardware and software acquisition	C	C
Systems operations	B	B

C=Centralized, D=Decentralized, B=Both

Bull's SI capabilities are primarily concentrated in the area of application systems development and implementation, as shown in Exhibit BUL-4.

Bull's SI staff ranges between 425 and 625, according to the distribution presented in Exhibit BUL-5.

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EXHIBIT BUL-4

Distribution of Staff Capabilities to SI Activities—Bull

Capability	Percent
Management, strategy and planning	5
Legal support/contract administration	3
Project management	7
Systems development/implementation	60
Hardware/software evaluation/acquisition	10
Hardware engineering	5
Sales	10

EXHIBIT BUL-5

Distribution of Bull's SI Employees

SI Sector and Status	Number
Commercial SI—full-time employees	100-200
Commercial SI—additional employees	50
Federal SI—full-time employees	200-300
Federal SI—additional employees	75

7. SI Business Objectives

Bull's pursuit of SI projects is focused sharply on profits and responding to customer demand. A secondary objective is establishing a potential for follow-on facilities management contracts. Although not cited by Bull as motivating factors in its SI business, INPUT believes that Bull will use its SI business to maintain a satisfied customer base and leverage follow-on hardware and software sales opportunities.

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8. SI Capabilities Evaluation

Bull offers the full range of SI services: consulting, design/integration, project management, hardware, communications products, system software, etc. In particular, Bull has strength in its on-line transaction processing and distributed information applications systems, as well as support for individual workstation and work group applications. Bull shows strength in nearly all areas, with additional strength gained from alliances, as shown in Exhibit BUL-6.

BUL-6

Bull's SI Capabilities and Use of Alliances

SI Capability	Strength	Alliance
Business consulting	Medium	Yes
Design methodology	High	Yes
Design/integration	High	Yes
Project management	High	Yes
Software development	High	Yes
Education/training/documentation	High	Yes
Packaged applications software	High	Yes
Packaged systems software	High	No
Standard computer hardware	High	Yes
Custom computer hardware	Medium	Yes
Communications hardware	Medium	Yes
Network management/operations	Low	Yes
Service and repair	High	No
Software maintenance	High	Yes

9. SI Strategic Alliances

As shown in Exhibit BUL-6, Bull uses alliances in nearly every area of its SI business. Bull uses both contract-by-contract and long-term alliances to support its SI activities under a formal alliances program. Bull's alliance partners, for example, range from British Telecom in the U.K. to Andersen Consulting in France, to Deloitte Touche in the U.S. In general, however, Bull's alliances support its SI business in the following ways:

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- By broadening Bull's products and services offerings
- By satisfying customers' specific solution requirements
- By opening new markets in conjunction with "build versus buy" analyses

10. SI Capabilities Summary

Bull clearly offers a full range of SI products and services. Although Bull did not identify specific SI products or services that give Bull advantage over its competition, INPUT notes that Bull should gain advantage in several areas:

- A lean organization - The preponderance of staffing supports the delivery of SI products and services.
- Breadth of SI offering - Whether through in-house staff or alliance, Bull can deliver all the capabilities required for success in the SI marketplace.
- Breadth of alliances - Bull's alliances strengthen both the quality and responsiveness of Bull's SI capabilities.

Bull's wide range of services, supported by alliances, should make Bull able to support any required service needed, and demonstrate no apparent internal weaknesses in its SI offerings.

11. SI Marketing Strategy

Bull's dominant marketing strategy is to pursue functional targets. Stressing connectivity through open systems and promoting individual and work group productivity products, Bull concentrates on doing a few things very well. Bull's market targets, both vertical and functional, are summarized in Exhibit BUL-2.

Competitors - Bull's primary competition, in both commercial and federal SI markets, is summarized in Exhibit BUL-7.

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EXHIBIT BUL-7

Bull's Primary Competition Commercial and Federal

Commercial	Federal
Consulting firms	CSC
EDS	EDS
IBM	IBM
Regional software/ services vendors	McDonnell Douglas Unisys

- Positioning - Bull positions itself as a full-service SI services provider by offering all the required capabilities; it can perform any required service, whether in-house or through one or more of its alliances. Bull focuses on providing quality products and services while it maintains its solution orientation.

- Promotion - Bull uses all the forms of promotion identified by INPUT in its 1990 survey: public seminars, direct mail, advertising in general and trade/industry publications, television advertising, and client referrals—with varying levels of effectiveness. Bull finds advertising in trade/industry publications to be highly effective, along with word-of-mouth client referrals. Public seminars, television, and general business advertising are reported to be only moderately effective. Direct mail is relatively ineffective for Bull.

12. SI Customer Base

Groupe Bull has systems integration experience in Europe that it can leverage to advantage because of its stature as a worldwide equipment vendor. Typical of its broad experience are the projects listed in Exhibit BUL-8. They represent the range of technologies that Groupe Bull—as a full-service systems integrator—provides, and the range of clients and applications it is capable of addressing.

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EXHIBIT BUL-8

Typical Groupe Bull SI Projects

Client	Project	Technologies
Ansaldo (Italy)	Complete plant automation	UNIX TCP/IP MRPII X.25 Multivendor equipment
Dept. Social Services (U.K.)	Largest operational European OSI network	DSA/OSI X.25 ICL GCOS 6
Post Office (France)	Workstation network for Financial Services Department	UNIX LAN X.25
Superior Court (MA)	Automation	UNIX Multi-vendor equipment

13. Summary

INPUT identifies Bull as a vigorous competitor in the SI marketplace, since it has chosen to be a full-service SI vendor by developing all the required SI capabilities either in-house or through alliances. It is apparent in its wide array of alliances that in promoting quality and responsiveness, Bull intends to grow with the SI market.

Groupe Bull is well positioned to be a worldwide systems integrator serving the needs of its global clients. The recent acquisition of Honeywell Federal Systems, Inc. enhances that capability still further. The emphasis on systems integration is in line with the overall company strategy of expanding its role from that of an equipment vendor to that of a full-service provider in the information technology industry.

The systems integration orientation will strengthen Group Bull's image as a problem solver and business partner among clients and prospects. The move into systems integration is viewed as positive internally, since the systems integration market is a clearly defined, maturing market that has been profitable for the vendor community.

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COMPANY PROFILE

Cincinnati Bell Information Services (CBIS)

1. Key SI Contacts

Mr. Mike Schuster
President
CBIS Systems Integration Group
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Mr. Mark Rohde
Vice President
National Government Market Development
12750 Fair Lakes Circle
Fairfax, VA 22033

Mr. Ray Zoeller
Vice President
Financial Services Market Development
12750 Fair Lakes Circle
Fairfax, VA 22033

Ms. Sally Shuler
Vice President
Communications Market Development
600 Vine Street
Cincinnati, OH 45202

2. Description of Principal Business

Cincinnati Bell Systems Integration Group is an operating division of Cincinnati Bell Information Systems (CBIS). CBIS is an unregulated entity of Cincinnati Bell. Cincinnati Bell is part of the Ameritech regional Bell operating company.

Cincinnati Bell's principal business is the provision of (voice and data) telecommunications services in the state of Ohio. Principal operating entities include Cincinnati Bell Telephone, Cincinnati Bell Information Systems, MATRIXX Marketing, Cincinnati Bell Directory, Cincinnati Bell Long Distance, and Cincinnati Bell Supply.

The company notes in its annual report that the systems integration group was formed to supply a wide range of data processing services to the federal government and its prime contractors, and to financial institutions.

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Systems integration services have been provided to the federal market for eleven years and to the commercial market for eight years.

3. CBIS Competitive Position

Company documents do not specifically identify revenues for systems integration. However, CBIS's 1990 revenues for information systems and telecommunications services, which include systems integration, were approximately $400 million.

Following the breakup of AT&T, many of the regional companies and local service providers began to diversify into other areas. Cincinnati Bell placed emphasis on developing the expertise of CBIS and marketing a wide variety of products.

Key to CBIS' growth has been its expertise in systems development of large telephone company management systems. It has marketed the systems to domestic and international customers. From this base, CBIS began to provide systems and services to the cellular telephone industry and, subsequently, expanded into providing systems operations services to that industry. CBIS is now one of the largest providers of billing services to the cellular telephone industry.

Looking for further diversification opportunities, CBIS began expanding into new technologies such as electronic imaging, now a key focus of the company.

In the telephone industry, CBIS has become recognized as a high-quality provider of systems and services.

The company believes it has competitive strengths in a number of areas.

- It has developed expertise in the use of CASE tools and a life cycle design methodology.
- It is independent of any specific hardware or software vendor. This contributes better bottom-line, cost-effective solutions.
- It has significant experience in establishing connectivity and interoperability between various types of networks.
- It has an ability to implement multisystem network management platforms.
- It can provide true end-to-end, operating management of systems and networks.

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4. Markets Served

As stated in the company's annual report, CBIS' strategy is to be a leader in a few selected markets. The markets specifically targeted are shown in Exhibit CBIS-1. There is no indication that the company will be expanding into other areas in the near term.

EXHIBIT CBIS-1

SI Vertical Market Focus—CBIS

- Telecommunications carriers
- Federal government
- Financial services

5. Recent Events

In the past year, the company made a number of acquisitions to strengthen its position in systems development and marketing. Acquisitions by the systems integration group include the following:

- Federal Information Technologies, Washington, DC.—The company specializes in local- and wide-area network management design, development, and implementation.
- Vanguard Technologies Inc., Fairfax, VA—Acquired to increase CBIS' ADP services strength in the federal government.
- OAO Corporation, Greenbelt, MD—The company has a seven-year contract with the Internal Revenue Service for automated data processing support. The contract is valued at $350 million.

6. CBIS Organization

CBIS is divided into three operating divisions: Communications Systems Group (CSG), Systems Integration Group (SIG), and CBIS Europe Group (CEG).

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CSG is comprised of Telecommunications Information Systems, Mobile Communications, and CBIS International. Its clients include interexchange carriers, local exchange carriers, independent telephone companies, regional Bell operating companies, foreign postal, telegraph and telephone companies, government agencies, switch manufacturers, cellular carriers, and paging providers.

SIG is comprised of the Systems Engineering Division, Image Management Division, Systems Management Division, Strategic Management Consulting Division, Network Engineering Division, Government Integration Systems, and Commercial Systems Integration. SIG's clients are state and national governments (and their prime contractors), financial services institutions and communications providers.

CEG markets the full range of CBIS products and services in Europe. Its markets are European postal, telegraph and telephone organizations, mobile telecommunications providers and their resellers, telecommunications equipment manufacturers, and providers of corporate networks and new competing networks.

7. SI Objectives and Revenues

Building on a base of $400 million in 1990, significant growth is expected over the next five years. CBIS expects its commercial SI business to grow at 22% per year and its federal revenues to grow at 16%. The company reports that 80% of its commercial revenues are derived from new clients. In the federal sector, only 20% of revenues are derived from new clients.

Of the total revenue, 60% is derived from contracts performed as a prime contractor. The other 40% is from subcontracting to other, major SI vendors. The company reports that its margins on commercial contracts are increasing and that margins on federal contracts are decreasing.

Many systems integrators report that they realize the greatest margins on custom software development. For CBIS, custom software development provides less of a return than customized hardware and software packages. The difference reflects CBIS' significant investment in systems for the telecommunications industry. CBIS also indicates a high margin on project management. The company reports low margins on standard hardware and software.

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8. Internal SI Capabilities Evaluation

The company reports that it currently has in-house capability to address a broad range of systems integration requirements. As would be expected of a communications company, CBIS considers communications-related knowledge of the greatest value. All other areas of knowledge are rated as of medium value.

9. SI Strategic Alliances

The company establishes alliances primarily for the purpose of enhancing skills, capabilities, and resources to penetrate new markets, and to complement its strengths. In all cases, alliances are used to improve CBIS' probability of winning an opportunity or penetrating a market.

The company utilizes both long-term agreements and agreements related to a specific contract. Long-term agreements are used primarily to help penetrate new markets. Short-term contracts have traditionally been used to satisfy federal contract requirements.

10. SI Marketing Strategy

As previously noted, CBIS focuses on three vertical industries: telecommunications, the federal government, and financial services.

To determine key target markets, CBIS looks for areas that are heavily information-based, solution-oriented, and mission/service-focused.

The company's marketing strategy is fairly traditional. In the federal government market, 90% of CBIS' opportunities result from response to RFPs. Only 10% result from leveraging existing clients. In the commercial market, 80% of the company's business is developed through proactive marketing. Only 10% results from client references and 10% results from responding to specific requests.

The company positions itself as an independent organization skilled in the full range of system life cycle activities. It has a wide range of expertise in telecommunications, data processing, imaging, systems engineering, and systems management.

Services are marketed primarily through direct mail, public seminars, client referrals, and active sales efforts. Client referrals and direct sales are the most successful. The company indicates that 80% of its new business results from direct sales efforts.

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The company's key competitors are shown in Exhibit CBIS-2.

EXHIBIT CBIS-2

Key SI Competitors

Federal	Commercial
EDS	Andersen
CSC	Price Waterhouse
SAIC	EDS
	PRC

11. SI Customer Base

The company has been providing systems integration services for 18 years and currently has more than 50 clients. Of the total, 40 are from the federal sector. CBIS reports that commercial contracts range in value from $1-3 million and federal contracts range in value from $5-15 million.

In the commercial sector, 50% of CBIS' revenues result from the provision of professional services. Revenue from equipment and packaged software is equally split at 25% each. In the federal sector, the company reports that revenues from the provision of equipment and professional services each represent 25%. Packaged software represents 10%. The company has not identified the source of the additional 40%.

Unlike other systems integration vendors, CBIS reports that its projects are evenly split between mainframe and distributed systems, at 50% each. Other vendors report a much higher percent for distributed systems. The distinction is a reflection of CBIS' background and expertise in developing large, complex systems for the telecommunications industry.

The company reports that a number of projects are indicative of its broad range of capabilities. The projects identified are the following:

- Treasury/IRS—ADP Support Services
- USDA/FHA—IRM Support Services

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- HUD—Facilities management, subcontractor to Martin Marietta
- Justice—Systems Development Life Cycle task order
- State of Virginia Vital Records
- Kelly Services—Document imaging system
- American Family Life Assurance Company—Document imaging system
- Canadian Imperial Bank of Commerce
- Central Fidelity Bank
- Bay Banks
- Comerica Bank
- First National Bank of Chicago
- Frost Bank—Check imaging system
- National City Corporation

12. Summary and Future Directions

CBIS has greatly enhanced its position to provide systems integration services to the federal government by acquiring three organizations dedicated to this market. In the commercial market, the demand for network integration expertise continues to grow. CBIS is staffed to respond to this need as it develops.

These two factors are an indication of the company's strong position as a systems integrator targeting markets in which it can provide a depth of expertise. This strategy should be effective in helping CBIS to continue to grow at or above past growth rates in the next few years.

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COMPANY PROFILE

Computer Sciences Corporation

1. Key Systems Operations Contacts

Systems Group (Federal Systems Integration)

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Consulting Group (Commercial Systems Integration)

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Waltham, MA 02154

2. Description of Principal Business

Computer Sciences Corporation describes itself as a provider of broad-based management consulting services in the strategic use of information technology; the development and implementation of complete information systems; and the provision to clients of the entire range of data processing services, commonly known as outsourcing. The firm manufactures minimal amounts of equipment, mainly in the communications area. It provides specialized, proprietary services to specific markets such as finance, health care, claims processing, network management, and income tax processing. CSC also provides remote computing services to private industry and government.

CSC is divided into four functional divisions or groups. Systems Group markets and manages federal systems integration projects; Consulting Group does the same for commercial projects; CSC Europe, as the title implies, is responsible for European system integration operations. The Industry Services Group manages CSC outsourcing and proprietary services offerings.

The company has been in the federal systems integration business for thirty years and in the commercial sector for sixteen years. Of its 26,500 employees, 4,400 are deemed to be dedicated to the SI function: 3,000 in the federal sector, and 1,400 in the commercial.

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Exhibit CSC-1 includes the company's revenues for fiscal 1992, which ended on the closest Friday to March 31, 1992. Figures for the third quarter FY 1993 showed approximately the same kind of ratio of federal government to commercial revenues of approximately 57% versus 43%.

EXHIBIT CSC-1

Computer Sciences Corporation

Fiscal Year 1992 by Business Segment[1]

Business Segment	Revenues ($ Millions)	Percent
Systems Group[2]	1,212	57
CSC Consulting[3]	689	33
Industry Services Group[4]	–	–
CSC Europe	212	10

1. Fiscal year ended on the closest Friday to March 31, 1992.
2. Figure represented includes all federal agencies (DoD, NASA, and civil agencies)
3. Figure includes $37 million in state and local government, which CSC reports as commercial revenue.
4. Not reported as a separate entity in FYI 1992 CSC Annual Report. Listed in the report's general description of operations as representing 39% of federal and commercial revenues.

CSC did not break out outsourcing revenues as a separate category in its 1992 Annual Report. It did, however, provide the figure of 39% as the percentage of both federal and commercial revenues generated by outsourcing. INPUT estimates that outsourcing and related services actually represents approximately 50% of CSC commercial revenues. With the $3 billion, 10-year outsourcing contract signed with General Dynamics in fiscal 1992, as well as its stated intention to increase its marketing effort in this area, that percentage is likely to remain constant or increase.

As illustrated in Exhibit CSC-2, the company states that its SI revenues for FY 1992 were $551 million and it estimates revenues for FY 1993 at up to $700 million. The breakdown between federal and commercial business respectively is $465 million/$86 million (FY 1992); $500-600 million (est./FY 1993)/$100 million (est./FY 1993).

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EXHIBIT CSC-2

Computer Sciences Corporation

Systems Integration Profile

	FY 1992 Revenue ($ Millions)	FY 1993 Revenue/Est. ($ Millions)	Employees
Federal	456	500-600	3,000
Commercial	86	100	1,400
Totals	542	600-700	4,400

The average commercial contract is approximately $1.5 million; the average federal contract is approximately $250 million. Contract values in both sectors have been increasing and profitability in both sectors has been stable, according to CSC management, with commercial profitability averaging around 13% and federal project profitability at approximately 7%.

3. Competitive Position

CSC is an aggressive company with an excellent track record. During the last three recession years, the firm has achieved growth in both revenues and profitability.

In recent years, the CSC award rate has been consistently between 55% and 60%. 1992 was no exception, with an award rate of 55%. This is all the more impressive when measured against the fact that the firm has made a concerted effort during this period to reduce the federal business (as a percent of revenue) on which the firm was founded and dramatically expand its commercial business. A lowered award rate, slower growth, and diminished profitability would not be an unreasonable expectation during such a transition. Clearly, however, CSC management has managed the transition skillfully.

In 1987, when CSC was almost exclusively a federal vendor, the firm announced that it would attain 50% of its profits from commercial business by 1992, based on increasing its commercial revenues to 40% of the total. While CSC does not break out profits by operating groups, the firm has exceeded its 1992 goal, with 43% of its revenues generated by commercial accounts. As illustrated in Exhibit CSC-3, the firm has done so in a steady, methodical progression over the course of its five-year plan.

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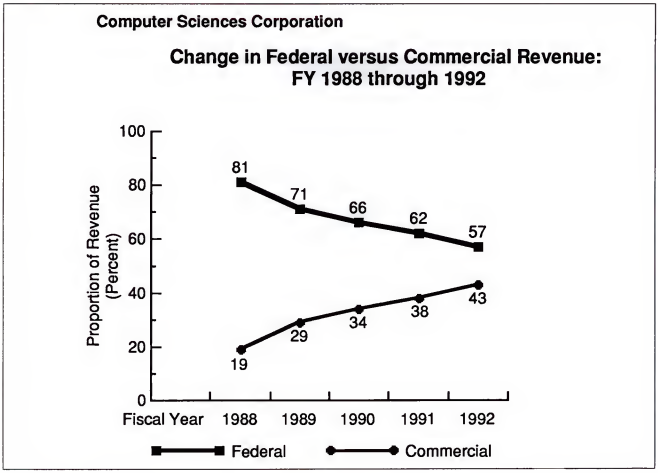
EXHIBIT CSC-3



CSC has followed an extremely prudent, well-balanced marketing effort, which has allowed it to both "weather" the recession and emerge into a recovering economy with enormous financial strength. A significant effort in outsourcing over the last three years has allowed the firm to take advantage of the one sector of the IS industry which has seen significant growth.

That outsourcing effort culminated in November 1991 with the signing of the largest contract ever written: a $3 billion, 10-year agreement with General Dynamics. Under that agreement Computer Sciences will supply its aerospace and defense units with data center management, applications development, and network and client/server operations.

While CSC has clearly spent time and effort developing its outsourcing business through its Industry Services Group, it has by no means been idle in positioning itself for its next round of growth in the systems integration market. It appears to have anticipated well both the technology it will require and the business services it will have to provide to achieve a leading position in the commercial SI sector.

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Exhibit CSC-4 provides an overview of factors that will continue the CSC drive into the commercial market.

EXHIBIT CSC-4

Computer Sciences Corporation

SI Industry Commercial Leadership Elements

- Marketing-oriented senior management
- Market-responsive technology
  - J-CALS/E-CALS
  - CSC Intelicom acquisition
- Front-end focus: "business re-engineering"
- Substantial capital to drive efforts
  - Technology development
  - Demonstration centers

First and foremost, CSC management is clearly marketing-oriented. While it is difficult to say that management started developing its outsourcing business in anticipation of the recession that quickly followed, it is most likely that opportunity and an instinct for diversification drove the decision to pursue the business in anticipation of recession and the likely jump in business that the sector would experience.

Second, CSC technology appears to anticipate market requirements well. J-CALS (Joint-CALS), the basic document-management architecture for which CSC was awarded a $744 million dollar DoD contract, provided a funded development effort for which the firm is now realizing significant commercial potential. An E-CALS (Enterprise-CALS) version is meeting a strong commercial reception in firms ranging from Caterpillar, Rockwell, and General Dynamics to Merck, 3M, and Pacific Bell. CSC no doubt envisioned expanding J-CALS from DoD to commercial concerns with a need to tie into the system. At that level of user acceptance, the push into the general commercial market would be considerably easier.

The acquisition of the telecommunications firm Intelicom in late 1991 bolstered the CSC position in large-scale information systems. This is a leading-edge marketing area previously identified by INPUT as a necessary area for SI vendor internal development.

The 1992 Computer Sciences Annual Report also addresses the concept of "re-engineering," not as a technical reworking of mainframe systems into a distributed processing network, but as a "front-end" business consulting concept. CSC is using it as a focus to capture the business process con-

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sulting contracts that are integral to major commercial SI contracts. For the past two years, CSC Index has been conducting the CSC Exchange, a week-long forum for senior business and information systems executives which, in addition to a variety of technical areas, covers a number of proposals to increase productivity in vertical markets identified as leading growth areas. The session attracted 1,135 senior executives from more than 500 organizations—nearly double the previous year's figure.

CSC has also begun constructing demonstration centers patterned after the Arthur Andersen model. With CSC's financial resources and marketing savvy, Andersen is, without a doubt, keeping an eye on this activity.

The only negative area in the CSC picture is CSC Europe. Recession and organizational problems have left revenues flat for the past two years and produced the only loss for the organization.

4. Markets Served

CSC has expanded and diversified its once parochial expertise to encompass a wide range of vertical and functional markets. It has done so primarily over the last five years via an aggressive course of acquisitions which, by and large, have been wisely chosen. The list of CSC vertical market expertise and functional skills (illustrated in Exhibit CSC-5) matches well with INPUT's high growth industry projections.

The horizontal/functional experience listed has been gained primarily through CSC federal projects. But the company has been shrewd in its handling of technology and its strategies for carrying it over into the commercial sector.

On the commercial side, CSC Partners provides vertical market expertise in manufacturing, distribution, finance, insurance, retail, publishing, utilities, and state and local government. Cleveland Consulting adds depth in consulting in logistics and operations management. Through Cleveland Consulting, CSC acquired Paragon Consulting Group, a Dallas-based firm specializing in operations management consulting services to food and consumer products manufacturers. The firm has performed projects for such clients as Frito-Lay, Coca-Cola, Pizza Hut, and Taylor Instruments.

CSC Index (acquired in 1988 for $30 million) is a leading consulting firm to major U.S. and European companies. It specializes in the strategic use and management of information technology. Butler Cox, a London-based information technology management consulting firm acquired in 1991, was merged into Index. It is also Index, as previously mentioned, that spearheads CSC's seminar/marketing effort, CSC Exchange. In fact, it may be Index that is driving the firm's marketing efforts in front-end consulting.

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EXHIBIT CSC-5

Computer Sciences Corporation

SI Industry Markets

Vertical Industry	Functional/Horizontal
Distribution	Digital image handling
Federal government	Distributed processing
Finance	Distribution/logistics
Insurance	Facilities management
Manufacturing	Management systems
Publishing	Networking
Retail	Office automation
State and local government	Relational database mgmt.
Telecommunications providers	
Transportation	
Utilities	
Wholesale	

6. CSC Organization

The CSC organization structure is illustrated in Exhibit CSC-6. Corporate headquarters are in El Segundo, CA. The Company provides its products and services through four operating groups, listed as separate subsidiaries:

1. ***Consulting Group*** is made up of three divisions that deal specifically with CSC commercial business. CSC Partners is the primary systems integration marketing and project management arm. CSC Index handles the front-end business consulting function. CSC Intelicom specializes in telecommunications functions. The division is based in Waltham, MA.

2. ***CSC Europe*** has offices in the U.K., Belgium, France, Germany, the Netherlands, and two in Poland (opened in FY 1992). European operations were restructured in 1992 and a new president appointed to deal with division losses and the recessionary European economic climate.

3. ***Industry Services Group,*** whose headquarters are in El Segundo, CA, is comprised of seven divisions servicing vertical markets with outsourcing and industry-specific services. These include insurance, health care, and consumer finance. The General Dynamics contract is handled by this group.

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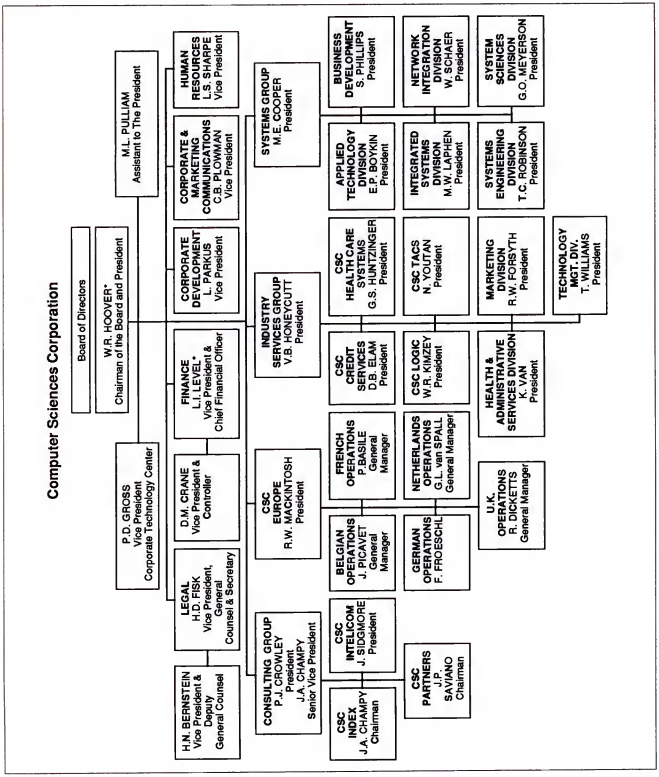
4. ***Systems Group*** is made up of six divisions that provide systems integration and processing services to the federal government. The group is based in Falls Church, VA.

EXHIBIT CSC-6



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The staff allocation figures provided by CSC (Exhibit CSC-7) are somewhat atypical for the industry. The most significant item is a 15% staff allocation in the commercial division dedicated to management, strategy, and planning, which is anywhere from 50% to 150% greater than one would find in an established commercial marketing entity. Given the stated CSC intention of strengthening this area of its business, such a staff allocation is consistent with the goal. Yet its allocation to sales is more consistent with an established commercial entity, such as Andersen.

EXHIBIT CSC-7

Computer Sciences Corporation

Staff Allocation

Function	Commercial (Percent)	Federal (Percent)
Management, strategy, and planning	15	5
Legal support/contract administration	1	2
Project management	10	8
Systems development/implementation	59	45
Hardware/software evaluation/acquisition	5	19
Hardware engineering	5	20
Sales	5	1

The CSC choices regarding the centralization or decentralization of business functions are totally unorthodox and at odds with industry trends. As illustrated in Exhibit CSC-8, the firm has opted for a centralization of account management and sales in its commercial sector as well as centralized project management and implementation functions. Centralized control of the sales function can be viewed as consistent with a tightly controlled marketing policy, but the strategy and long-range planning function is decentralized. This reflects the autonomy which the company continues to give to its acquisitions such as CSC Partners and CSC Index.

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EXHIBIT CSC-8

Computer Sciences Corporation

Centralization/Decentralization of SI Business Functions

Function	Commercial (Percent)	Federal (Percent)
Strategy/long range planning	D	C
Marketing and promotion	D	C
Account management/sales	C	C
Contract review/approval	C	D
Project management/control	C	D
Implementation/development	C	D
Hardware/software acquisition	C	D
Systems operations	D	D

C=Centralized; D=Decentralized

On the project management and implementation side, the firm's federal division runs a more conventional, decentralized functions policy, no doubt for the speed, efficiencies, and economies that result. The opposing orientation on the commercial side is a reflection of a truly autonomous management in that subsidiary, with a distinctly technical orientation.

While one cannot criticize CSC commercial sector growth or profitability over the past several years, much of both have been due to its outsourcing efforts. Commercial SI contracts, though numerous, have been relatively small. Assuming that CSC successfully continues its movement into the commercial sector, it is likely that it will ultimately conform to a more traditional functional structure. As account wins grow larger and more numerous, the firm will simply not be able to react quickly or economically enough to project management and implementation requirements on a centralized basis, a fact that CSC has already acknowledged in its federal division.

In describing its relative profitability margins (Exhibit CSC-9) the firm differs from the profile of most other SI vendors, defining high margins from standard hardware and software and medium margins from the typically high-profitability components of consulting, custom software and

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project management. The labor-intensive areas of training and education, though profitable for most SI vendors, are generally not characterized as high-margin items as described by CSC.

EXHIBIT CSC-9

Relative Profitability
CSC System Integration Components

Integration Component	Profitability
Standard hardware and software	H
Customized hardware and software	L
Software packages	H
Consulting/design/integration	M
Custom software development	M
Project management	M
Training and education	H
Post-installation operations	L

H=High; M=Medium; L=Low

High profitability on standard hardware and software is normally associated with a vendor that uses its own products. Lower profitability on custom software would suggest that the firm will accept a smaller margin on such development and view it as paid development on which it will achieve profitability on future project application.

Another possibility lies in the manner in which CSC functions in the federal versus the commercial sectors. In the federal sector, 75% of its revenues are derived as prime systems integration contractor, with the balance from subcontracting to another vendor. In the commercial sector, only 50% of revenue is currently derived as prime contractor. The other 50% comes from supporting client-managed SI projects.

Such a high percentage of client-managed projects may well tend to skew profitability figures, as SI projects may result from outsourcing contracts or other types of projects where profitability may be derived from combined sources. However, the medium profitability on consulting/ design/ integration, as well as on project management, suggests that CSC will indeed make adjustments to its business functions, particularly as it seriously moves into the commercial systems integration sector as prime vendor on increasingly larger projects.

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7. SI Business Objectives

As illustrated in Exhibit CSC-10, the firm views SI as a profit center in both the federal and commercial sectors. Both divisions also see response to customer demands and the strengthening of non-SI business as primary. Control of the account base is viewed as a secondary consideration by both divisions. The federal division sees a secondary benefit in follow-on facilities management contracts that is not shared by the commercial division.

EXHIBIT CSC-10

Computer Sciences Corporation

SI Business Objectives

Function	Commercial P/S*	Federal P/S*
Revenues/profits from systems integration	P	P
Control of account base	S	S
Response to customer demands	P	P
Strengthen non-SI business	P	P

*P = primary, S = secondary

8. SI Capabilities Evaluation

Despite the fact that CSC responses differed somewhat from most SI vendors' in the areas of profitability and business function organization, it was more consistent in the value it placed on internal capabilities (Exhibit CSC-11). Packaged software and standard hardware were given a low value rating, despite the fact that CSC derived a high profit from these items. Training, another area identified by CSC as producing high profits, was given only a medium value rating.

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EXHIBIT CSC-11

Computer Sciences Corporation

Self-Assessed Capabilities(1)

Capability	Exists	Value[2]	Alliance
Business consulting	Y	H	N(3)
Design methodology	Y	H	N
Design/integration	Y	H	N
Project management	Y	H	N
Software development	Y	H	N
Education/training/documentation	Y	H(4)	Y
Packaged applications software	N	L(5)	Y
Packaged systems software	N	L(5)	Y
Standard computer hardware	N	L(5)	Y
Custom computer hardware	N	L(5)	Y
Communications hardware	N	L	Y
Network management/operations	N	L(6)	Y
Service and repair	N(3)	L(4)	Y
Software maintenance	N(3)	L(6)	Y

(1) Responses were the same for both federal and commercial divisions, with exceptions noted.
(2) H = High; M = Medium; L = Low.
(3) Federal division responded 'Y'.
(4) Federal division rated as 'M'.
(5) Federal division left blank.
(6) Federal division rated 'H'.

Perhaps the most interesting difference occurred between the federal and commercial divisions themselves. The commercial division indicated that it had no alliances to support its business consulting activity: not surprising considering the division's effort at expanding its commercial account base and its acquisitions in the past two years, combined with the critical role which this function plays in that mission. It is a function which any commercial contender must develop internally.

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The federal division, on the other hand, indicated that it did have alliances to satisfy the business consulting function. Specific firms were not, however, identified.

9. SI Strategic Alliances

CSC has historically been reluctant to discuss alliances. Even in the commonly accepted area of packaged software and hardware, the firm has been reluctant to suggest that it is anything but independent and free to provide the best solution to a customer's project requirement, without parochial considerations. Yet CSC has clearly demonstrated a capacity and willingness to work with any supplier necessary to get the job done.

The firm acknowledges alliances with Borland, HP, and DEC. It has worked with IBM on some notable projects and clearly has a long-term relationship with AT&T. Internationally, CSC continues to work with British Telecom via a joint marketing agreement.

CSC is certainly more willing now to acknowledge the fact of alliances, if not always the specifics. It is apparently moving to address its geographical weakness with alliances that it refers to as "logistical."

10. SI Marketing Strategy

As illustrated in Exhibit CSC-12, formal marketing activity by CSC has been relatively modest, even by the conservative standards of the SI vendor community. CSC Index has been actively spearheading the firm's seminar effort in the commercial sector, relying on individual contacts made by their sales force and by the leveraging of existing accounts.

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EXHIBIT CSC-12

Computer Sciences Corporation

Methods of Promotion

Method	Use (Y/N)	H/M/L*
Public seminars	Y	H
Direct mail	N	–
Advertising (general business pubs)	N**	–
Advertising (trade or industry pubs)	N	–
Advertising (television)	N	–
Word of mouth/client referrals	Y	H
Other: direct sales	Y	H

*H=High activity/value; M=Medium activity/value; L=Low activity/value

**The federal division reports some use of business advertising to be of medium value.

If a company is known by its competitors, CSC has defined its marketing targets in defining its principal competitors. In the federal sector, while it lists Boeing, Grumman, and SAIC—all rivals in DoD accounts—EDS is first on the list, holding position in the new federal civilian account roster to which CSC is moving. While the firm will continue to bid on military contracts, it will continue to bid aggressively in areas such as GSA (scientific and business programming support) and Bureau of Land Management (automated land and records management system).

The CSC strategy appears to be relatively straightforward (see Exhibit CSC-13). The firm will concentrate on civilian agencies in the federal sector.

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EXHIBIT CSC-13

Computer Sciences Corporation

Competitors

Commercial	Federal
Andersen Consulting	EDS
IBM	Boeing
"Big 6"	Grumman
	SAIC

The commercial sector is where CSC has made its public statement of intent to achieve its most significant rate of growth. Here too, it has defined the sector leaders—Andersen and IBM—as its primary competitors.

It will diversify its base via outsourcing. Account experience gained can then be leveraged in other commercial accounts.

First and foremost, CSC will lead with Index (e.g., CSC Exchange, etc.) and attempt to develop the front-end business consulting reputation it has historically lacked. The Andersen model—capture the front-end consulting to lock up the subsequent project award—is no doubt serving as the model for CSC. Exhibit CSC-14 summarizes CSC's marketing strategy.

EXHIBIT CSC-14

Computer Sciences Corporation

SI Marketing Strategy

- Gradually shift focus in the federal sector to civilian agencies
- Copy the EDS success and diversify base via outsourcing
- Begin development in the commercial sector via acquisitions
- Leverage the account experience acquired via those acquisitions and appropriate federal experience
- Lead with front-end business consulting

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11. Summary

Despite its 30-year track record in federal projects, the federal division of CSC has derived only 30% of its current SI business from its existing account base. The commercial division, which CSC has openly targeted for growth, is currently responsible for 70% of its SI business from existing accounts. This would explain many of the contradictions and peculiarities in the firm's responses.

Clearly, the federal division has been making a significant push away from what it perceives as a stagnant account base. The commercial division, on the other hand, has been built largely through acquisitions. Aside from the long-term commercial development sought by CSC in those acquisitions, the firm was also pursuing the rapid addition of existing commercial accounts in the short term.

The marketing models developed by Andersen and EDS have obviously served both firms well. Certainly CSC is not the first company to note and emulate them. Computer Sciences has performed significantly above industry averages over the past 3 years, demonstrating its ability to weather difficult markets. It has the financial resources to challenge both Andersen and EDS, as well as a demonstrated capacity to step comfortably outside of its federal roots. But CSC might be well advised not to compete with either on its own terms, but rather develop an approach uniquely belonging to CSC that will force competitors outside of their historical strengths.

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COMPANY PROFILE

Computer Task Group (CTG)

1. Key SI Contacts

Computer Task Group, Inc.
800 Delaware Ave.
Buffalo, NY 14209
(716) 882-8000
Mr. Jack Courtney, President and COO

Computer Task Group
Industrial Systems Integration
1995 West NASA Blvd.
Melbourne, Florida 32902
(407) 725-1300
Mr. Vince Lamb, Sr. VP

2. Description of Principal Business

Computer Task Group, Inc. (CTG), founded in 1966, is one of the largest providers of computer-related consulting, systems integration, and professional services to the commercial market in the U.S. Services available through CTG include consulting, systems analysis and design, programming, software conversion, education and training, systems operations, information engineering, imaging technology, networking systems integration, and industrial systems integration.

CTG makes extensive use of software automation in its professional services contracts. The scope of professional services work performed by CTG ranges from specific, minor tasks of short duration to large, complex tasks that require larger numbers of systems engineers for extended periods. Typically, CTG's professional staff augments and becomes part of the client's on-site software development team on a specific application or project. However, in recent years CTG has established approximately 20 Software Development Centers located in branches to support off-site development and implementation in support of client projects.

In 1991, CTG reported revenue of $285 million, an increase from the $244 million reported for 1990. This follows an increase from the $233 million reported in 1989. Of even greater interest is the change in what CTG considers systems integration revenue from its 1990 SEC 10K filing to its 1991 SEC 10K filing. The network component of SI was taken out of reported SI revenue in CTG's 1991 SEC 10K. The 1991 SI

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revenue is now restated as $44 million—a 10% growth—rather than $32.3 million, which appeared to be a decrease when compared with the 1990 10K estimate of $40 million. (When restated for the 1991 10K, the 1990 estimate was reduced to $24.3 million.)

Revenue from IBM, which was about 5% of total revenue prior to IBM taking equity in CTG, grew from $42 million in 1990 (over 17% of CTG's total revenue) to $72 million in 1991, (over 25% of CTG's total revenue). In 1991, IBM accounted for 29% of domestic professional services revenue, 16% of SI revenue, and 6% of international professional services revenue.

INPUT expects IBM's growing importance to CTG to impact CTG's SI efforts.

CTG's mission is to excel in service to its customers through the application of information technology. The company has developed a strategic plan for the 1990s that includes the following:

- Continuing to focus sales and marketing efforts on industries where it has proven capabilities. These include discrete manufacturing, process manufacturing, banking and finance, insurance, and state and local government.

- Capitalizing on the strength of its branch network by continuing to broaden its geographic coverage with new field offices, and developing project business and specialized capabilities within the branch operations using practice groups designed to transfer technical industry skills to the traditional branch office structure.

- Expanding alliances, particularly in the international arena: an example is CTG's strategic alliance with SAP AG of Waldorf, Germany and its American subsidiary, SAP America.

- Focusing on European operations, with a goal of growing at a level that is, at minimum, equal to the growth rate of the European marketplace.

- Continuing focus on education for CTG consultants and engineers, as well as employee retention and recruiting of professionals with special skills.

CTG has pursued expansion by opening and/or acquiring field offices to attract and support clients. In the past five years, CTG has acquired ten firms ranging in size from $1 million to approximately $30 million in revenue. The purchase of Scientific Systems Services for approximately

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$11 million in January 1988 was significant in boosting CTG's presence in the systems integration market. Renamed Computer Task Group Industrial Systems Integration, it specializes in integrated computer systems for manufacturing.

CTG serves both the vertical and cross-industry markets.

3. Company Competitive Position

CTG is one of the largest providers of professional services to the commercial market in the U.S. Its primary strategy has been to be a customer's single source for systems design and programming support, made possible by a staff of over 3,000 systems professionals.

CTG's internally developed software design and development tools enable it to compete against larger firms for SI projects. CTG is a recognized leader in the systems conversion business and has very strong abilities in the DOS-to-MVS conversion market and in client/server architecture.

CTG targets its services primarily to large manufacturing, industrial automation, financial services, and telecommunications firms with large data processing operations. CTG clients include over 71 of the Fortune 100 companies, and over 90% of the firm's new professional services contracts come from the existing client base. Over 30 of CTG's clients have billings in excess of $1 million.

CTG will post SI revenues for 1991 in excess of $44 million, approximately 15% of the total revenue stream. Although this amount is not in a league with those of today's major players, it represents a significant revenue stream for a company that only does commercial SI. The revenues have been generated on over 177 commercial projects, with an average size of $450,000.

Between its 1991 and 1990 10Ks, CTG recast the way it counted SI revenue. This has made year-to-year comparisons difficult. CTG appears to be taking a very conservative approach to network integration revenue reporting. Other SI organizations are starting to include network integration revenue in total SI revenue.

4. Markets Served

CTG's general professional services business participates in virtually all significant vertical markets and a significant number of cross-industry markets. Exhibit CTG-I shows these markets.

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EXHIBIT CTG-1

Markets Served

- Vertical Markets:
  - Manufacturing
  - Petroleum
  - Pharmaceuticals
  - Metals production
  - Process manufacturing
  - Health care
- Functional areas:
  - Logistics
  - Warehouse automation
- Cross Industry:
  - Application outsourcing
  - Client/server
  - Networking
  - Electronic data interchange (EDI)

CTG's focus in these areas is stimulated by its belief that these areas, in addition to being growing market segments for SI, will permit CTG to leverage its established client base.

IBM was CTG's single largest client, at $72 million, in 1991. This was 25% of total revenue. IBM accounts for 16% of current SI revenue.

INPUT will closely observe the trend in CTG's revenue caused by the IBM account and the impact of this relationship on CTG's overall SI strategy.

5. Recent Events of Interest

As mentioned, CTG has been growing substantially through acquisitions. During 1990 CTG acquired Rendeck International N.V. of Amsterdam, a European provider of professional services primarily to large mainframe users in manufacturing, financial services, and banking. Rendeck was renamed Computer Task Group Europe B.V. in February 1991.

In September 1990, CTG acquired Connolly Data Systems, Inc. of Lowell, MA.

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- Connolly provides integrated PC local-area network systems in the northeastern U.S.

- Connolly had approximately 45 employees at the time of the acquisition and 1989 revenue of about $7 million.

CTG is working to unify the operations of its two acquired companies Connolly Data Systems and Telecommunications Management Consultants, both of Lowell, MA; CTG's internal Communication Services business unit; and CTG's new alliance with Novell, Inc. into an Enterprise Consulting Group.

CTG became an Alliance Partner of Novell, Inc. in 1991. It is taking part in Novell's Professional Developers Program. Under this program, CTG will provide NetWare-related consulting, integration, applications development and support services to increase the networking leader's presence in large, enterprisewide networking environments. Initially, CTG will focus on OS/2 integration with the NetWare 3.x product line.

CTG attributes some of its FY 1991 financial problems to a significant shortfall associated with a fixed-price contract of the systems integration unit, and on misjudgment of the impact of the economy in FY 1991 on both CTG and its major customers. The recession prevented the company from raising its rates.

In May 1992, CTG launched several practice groups designed to transfer technical and industrial skills to the company's traditional branch office structure. The new practices are:

- Communications System—Network-based applications, specializing in Novell LANs - Buffalo, NY

- Database Consulting—Informix, Ingres, and SQL/Server data bases and mainframe products like DB/2 - Raleigh, NC

- Image Systems Services - McLean, VA

- Industrial Systems Integration - Melbourne, FL

- Information Engineering - Buffalo, NY

- Information Media - Phoenix, AZ

- Migration Services—Transferring applications from mainframe to client/server technologies - Buffalo, NY.

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6. SI Organization

CTG operates with a lean corporate and administrative staff of only slightly over 400 from a total staff of over 4,000 employees listed as non-professional. Headquarters provides forecasting, strategy development, and financial management, leaving much of the other administrative responsibility to local branches, which are linked to headquarters via a PC/mainframe information network. CTG currently has over 70 offices.

CTG's Institute for Technical and Management Training in Buffalo provides in-depth training for CTG staff. Thirty technical and 20 marketing and management courses are offered. In addition, employees have access to a four-week course on CTG's Systems Engineering Development Programs. INPUT estimates that 200 employees attend these classes annually. Formal training courses are also offered at selected national branch offices.

Additional SI work is done by other matrixed units of CTG, such as the Corporate Projects Office and other specialty business groups. In general, the responsibilities are divided as indicated in Exhibit CTG-2. This is quite a change from INPUT's 1989 CTG vendor profile, when only SI contract approval was centralized.

The Commercial Systems Integration Services are provided to the manufacturing and industrial markets through CTG Industrial Systems Integration (formerly Scientific Systems Services). Services provided include management consulting; concept and applications planning studies; Control-Spec™ functional specification and scope-of-work contracts; systems architecture services, including hardware selection, systems software evaluation and selection, applications software, and communications; and project implementation.

CTG currently has a full-time commercial SI staff of approximately 500. In addition, it estimates that at any given time there are at least 25 other professionals assigned to SI projects. The breakdown of staff between various skill requirements is typical of systems integration vendors whose primary business has been professional services. This is summarized in Exhibit CTG-3.

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EXHIBIT CTG-2

Centralization/Decentralization of SI Business Function Computer Task Group

Responsibilities	Commercial	Federal
Strategy and long-range planning	C	N/A
Marketing and promotion	C	N/A
Account management/ sales	D	N/A
Contract review/approval	C	N/A
Project management/ control	B	N/A
Implementation/development	B	N/A
Hardware/software acquisition	C	N/A
Systems operations (if applicable)	B	N/A

C = Centralized, D = Decentralized, B = Both

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EXHIBIT CTG-3

Distribution of SI Personnel
Computer Task Group

Capability	Percent
Management, strategy, planning, marketing	1
Legal/contract administration, finance	1
Project management and administration	15
Design/development/implementation	68
Hardware/software evaluation/acquisition	5
Hardware engineering	5
Sales	5

7. SI Business Objectives

CTG has maintained a consistent strategy of being the customer's single source for design and programming support. This strategy has led the company to the development of broader professional services capabilities, and moved CTG into the position of a "full-service" provider. As a full-service provider and rapidly emerging player in the SI marketplace, CTG has adopted two primary objectives:

- Derive revenue and increased profit margins from the special capabilities provided as a systems integrator.
- Respond to existing customer demands for buying complete solutions.

CTG recognizes that the key to increasing profit margins is through specialization. By specializing, CTG is able to command premium rates for its staff. In essence, SI is one of the several professional services specialty areas through which CTG hopes to achieve its profit objectives.

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8. SI Capabilities Evaluation

CTG's primary strength lies in its professional services capabilities. Over 80% of its staff is college educated, and almost all of the systems engineering staff have skills in data base and communications technologies. By its own evaluation CTG ranks high in business consulting, design integration, project management, and software development. The following presents INPUT's assessment.

- Business consulting—Though not at the level of some of its competition in a broad range of industries, business consulting is a strength for CTG, particularly in manufacturing-related projects. CTG will use outside contractors and consultants to supplement its own capabilities.

- Design methodology/integration—Although CTG does not have a packaged methodology, it has made extensive use of automation to support the design and development process. This is a significant strength.

- Project management—Again, CTG has utilized technology and training of personnel to develop an effective capability. But though the approach is effective, it has not been applied to many very large projects. Given the aggressive approach to the market, this capability will undoubtedly be put to the test in the very near future.

- Software development—CTG demonstrates the state of the art in this area. Its use of advanced CASE tools and software development aids may be the best in the industry, and it appears to be making the educational and developmental efforts necessary to maintain that leadership position.

- Education, training, and documentation—CTG possesses these capabilities in house, and by INPUT's estimate is probably above average in capability. The company's use of automated software development tools should significantly contribute in the documentation area.

- Packaged applications and systems software—There are a few vertical markets in which the company has experience in this area and has begun to offer applications packages. However, INPUT believes that this is an area in which CTG could use significant strengthening. In the area of systems software, CTG has many important alliances.

- Standard computer hardware—CTG has extensive working experience with virtually all lines of IBM and DEC hardware. Other environments with which it has experience include: Honeywell, CDC Cyber, Prime, Data General, Harris and Hewlett-Packard.

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- Communications hardware—As in the case of computer hardware, CTG relies primarily on alliances and partners in the area of communications. The acquisition of Connolly provided CTG with communications hardware experience to supplement its computer hardware capability.

- Service, repair, and software maintenance—CTG now provides service in this area. Although the company does provide software maintenance, this is not one of its major systems integration marketing attributes.

9. Strategic Alliances

CTG recognizes the need to utilize alliances to provide the total solution to the customer and to bolster its general capabilities. It utilizes both long-term agreements and contract-by-contract arrangements to accomplish these objectives. CTG's alliances tend to break down as follows:

- Technology-based alliances tend to be long term in nature. They result from the need to remain state of the art in the application of particular technology that can be utilized in many client situations.

- Solution-specific alliances tend to be formed on a contract-by-contract basis where the need of a client is unique, and there appears to be no applicability of the need to a larger target market.

The majority of CTG's alliances have been formed with hardware and systems software vendors. The primary hardware alliances are with DEC, IBM and Novell. Other vendor alliances provide capabilities in 4GLs, expert systems, and relational data base management systems.

A summary of CTG's alliances is contained in Exhibit CTG-4.

10. SI Capabilities Summary

Compared to other systems integration vendors, CTG has developed above-average capabilities to participate in the SI market. This is particularly true in the middle of the systems integration life cycle, overall design through implementation. As mentioned in the SI capabilities evaluation, CTG's strengths are not in front-end business consulting or follow-on maintenance activities. In most areas where there appear to be some weaknesses, CTG has developed effective alliances or is rapidly on its way to building or acquiring an internal capability to meet the need. A good example is in data communications and network management, where as recently as two years ago CTG had below-average capabilities. The acquisition of Telecommunications Management, Inc., Connolly, and the internal development of a Data Communications Group are rapidly closing that gap.

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EXHIBIT CTG-4

Examples of CTG's Key Alliances

Hardware	IBM Digital
Applications Software	Cortrans Lotus Texas Instruments SAP America
Network/LAN	Novell Banyan
Consulting	A.T. Kearney

Other capabilities that work in CTG's favor as a systems integration vendor include:

- The Institute for Technical Management Training
- The Corporate Projects Office, established in 1985 to address large-scale systems development

Finally, CTG's leading-edge use of technology in the design, management, and implementation of systems gives it a competitive advantage that few other integrators from the professional services market can offer.

11. SI Marketing Strategy

CTG carries its philosophy of being a full-service provider into the SI marketing effort. While the company clearly does not have all the capabilities to support that position in house, it has made great strides in recent years through acquisitions and alliances to cover the approach successfully.

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CTG stresses the importance of delivering a competitive advantage to its customers through the application of technology. It has focused its SI marketing efforts on selected industries and cross-industry markets (see Section 4).

A large professional services client base and a large number of geographically dispersed offices allow CTG to approach the market proactively and opportunistically. CTG can:

- Respond to needs from existing clients
- Proactively sell SI services through the large number of branches

Other facets of CTG's marketing approach are described below and summarized in Exhibit CTG-5.

- Competitors - As would be expected, CTG sees Andersen Consulting, EDS, Digital Equipment, Computer Sciences Corporation, and AMS as major competitors in the systems integration marketplace. As CTG's reputation in the market grows, it will be competing with the major players in the market.
- Positioning - To its customers, CTG presents itself as an organization that can combine management and consulting skills with proven and extensive implementation capabilities to provide state-of-the-art solutions. It points to its financial track record and portfolio of specialized skills as key assets in selling contracts.
- Promotion - CTG utilizes public seminars, client referrals, and focused trade publication advertising as key avenues to spread the word about its capabilities in systems integration. To date it has done little or no advertising in general or industry trade publications. The company finds focused trade and industrial publications to be the most valuable advertising channels.

Overall, CTG's marketing strategy has been evolving quite rapidly during the past three years. INPUT anticipates an increasing level of proactive selling in its targeted markets during the coming year, as well as an increased emphasis on SI as a tool for achieving competitive advantage through the application of technology.

12. SI Customer Base

CTG's target markets include large organizations in discrete and process manufacturing, financial services, insurance, and state and local government.

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EXHIBIT CTG-5

CTG's SI Marketing Strategy

- Opportunistic approach
  - Selling through branches
  - Use of corporate project office
- Positioning: full-service provider
  - Selected vertical markets
  - Functional and technical specialities
- Customer benefits
  - Competitive advantage
  - Advanced technology (systems software)
  - Reduced risk (fixed-price offerings)
- Focused targets
  - Financial services
  - Industrial automation
  - Telecommunications
  - Systems conversions

- Seventy-one of the Fortune 100 and 237 of the Fortune 500 are CTG clients.
- Over 90% of revenue is derived from repeat business with existing clients.

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CTG's client base is segmented approximately as follows:

Discrete manufacturing	32%
Process manufacturing	23%
Services	16%
Banking and finance	9%
Insurance	5%
Distribution	5%
State and local government	3%
Other	7%
Total	100%

Approximately 87% of CTG's 1991 revenue was derived from the U.S., 11% from Europe, and 2% from Canada. A three-year source of revenue summary follows:

EXHIBIT CTG-6

Computer Task Group
Three-Year Source of Revenue Summary

	Fiscal Year					
	1991		1990		1989	
	Rev. ($M)	Percent	Rev. ($M)	Percent	Rev. ($M)	Percent
U.S.	248	87	227.1	93	223.6	96
Europe	32.7	11	12.9	5	5.2	2
Canada	4.4	2	3.9	2	4.2	2
Total	285.1	100	243.9	100	233.0	100

CTG has 75 business units in the U.S., Belgium, Canada, Denmark, England, Germany, and the Netherlands.

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As of this writing, CTG has completed over 100 SI projects. These clients are from the existing customer base and newly solicited clients, where CTG seems to be getting about 25% of its SI contracts. Some clients and projects are profiled in Exhibit CTG-7.

EXHIBIT CTG-7

Computer Task Group SI Project Examples

Company	SI Project
Brigham Women's Hospital	Voice and data resource sharing
Stone & Webster	Strategic communication network
Phoenix Insurance	Client/server downsizing
Marmot	Integrated network for guest information
Volkswagen	On-line parts ordering system
Univ. of Massachusetts	Three-campus network
Bechtel/Parsons	Design engineering network
North Star Steel	Plantwide support system
Baxter Travenol	Warehouse automation
Whirlpool	Real-time distributed warehouse

One of CTG's SI projects that had a major impact on the customer was the Computer Aided Radio Dispatch System (CARDS) designed and implemented for General Electric's Major Appliance Business Group. CTG developed a paperless, computer-based zone picking operation and recommended layout changes to utilize the warehouse in an optimal manner. CTG developed the software modules for order processing, operator route assignment, operator performance standards, order verification, and preloading operations. The system utilized radio frequency technology to communicate.

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The system resulted in a 70% improvement in material movement and enabled GE to reduce the number of lift trucks from 60 to 46 in a single shift. GE's products can now be shipped anywhere in the U.S. within 4 hours. When completed, this was the largest RF installation in the world. GE recovered its investment for this system within eight months.

13. Summary and Future Directions

Although CTG does not have the in-house capability to offer the full range of SI services, the company has formidable capabilities and is moving rapidly to cover any areas of weakness.

CTG has a superior set of in-house-developed system software tools for project management, software development, and conversions. In addition, the company's broad geographic coverage in the U.S. lessens dependence on the financial climate of a particular industry or region.

The large, well-trained systems engineering staff is a formidable asset that only the largest players—including Andersen Consulting, IBM, DEC, and EDS—can match. Though finding and developing these individuals is expensive, CTG seems to have put together a strong organization with superior qualities.

CTG's penetration of Fortune 500 firms (leading banks and financial services firms, top utilities, and telecommunications companies) indicates a solid sales capability and account control mechanism, especially for a company that is not widely known and until recently had limited SI capabilities.

Finally, CTG has recognized areas of weakness in its delivery capabilities for SI and is filling them through acquisitions and alliances.

All of these assets support the rapid expansion of CTG's SI business. The only areas of weakness appear to be in applications software, where to INPUT's knowledge CTG has few packages and a limited set of alliances.

A second area that will require some work is marketing. Market presence and image are rapidly becoming prerequisites for success in SI. Although CTG has a strong image as a contract software developer, it will need to pay more attention to making itself known as a systems integrator in the marketplace. INPUT believes that the key will be to build a track record of reference accounts that support the firm's strategy.

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To be a major player, INPUT believes that CTG should move in several areas:

- CTG needs to broaden its market focus to include more SI prospects, which means acquiring more vertical-industry expertise at the consulting and applications package levels, and increasing the depth of expertise in markets already served.

- The company also will need to more actively sell SI at the branch level.

Overall, CTG is a player that is likely to be in the majors within a few short years. It is a firm to be watched. Assuming that it can afford to make some of the investments suggested above, the future looks bright for CTG.

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COMPANY PROFILE

Control Data Corporation (CDC)

1. Key SI Contacts

Mr. E. E. Randol
General Manager
Open Systems Sales
Computer Products Group
Control Data
Box 0
Minneapolis, MN 55440-4700
Phone: 612-853-4687

2. Description of Principal Business

Control Data Corporation was founded in 1968. The company grew to be a leader in the production of high-performance computing systems and peripheral products. During its early growth years, CDC branched out into a variety of related and unrelated businesses, including financial and on-line educational and research systems.

Following a number of years of disappointing financial performance, the company began a process of trimming its size and refocusing resources into its core business.

The company is active in a number of markets including: mainframe, mini-, and desktop computing systems; peripheral products, and business and information services, including systems integration.

CDC has been providing systems integration services in the federal sector for the past twelve years and in the commercial sector for five.

3. CDC Competitive Position

Between 1989 and 1990, CDC's systems integration revenues declined by approximately 19%, to $637 million. However, during the same period, systems integration's share of total corporate revenue grew from approximately 21% to 30%, reflecting the company's increased interest in the services market.

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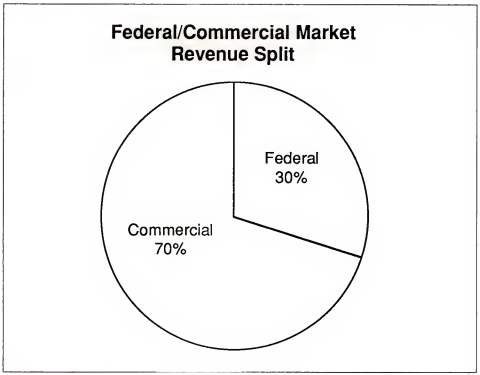
4. Market Served

Like many hardware-based companies, CDC has been active in the federal market for many years. As the commercial market began to emerge, CDC worked to leverage its federal expertise into the commercial market. As shown in Exhibit CDC-1, CDC currently derives 30% of it systems integration revenues from the federal market.

EXHIBIT CDC-1



Control Data targets primarily vertical markets, as shown in Exhibit CDC-2. Services provided to each market varies considerably.

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EXHIBIT CDC-2

SI Vertical Market Focus

- Marketing
- Electric utilities
- Telecommunications
- Federal government
- Business services

With the exception of the business services market, CDC focuses on services closely associated with high-performance computing. Manufacturers need high- performance computing for CAD/CAM. Electric utilities need high-performance computing for network design, analysis, and control.

Within the business services sector, CDC provides on-line data base services and financial services such as accounting and payroll.

5. Recent Events

In March 1991, CDC's Computer Products Division announced a $14 million contract with the Internal Revenue Service (IRS) for 11 CYBER 932 computer systems and services. The systems will be used for high-speed printing of large volumes of data at the ten IRS Service Centers located across the United States.

In May 1991, CDC's Government Systems Division and Computer Products Division teamed up to win a $6.5 million contract to develop a NASA space shuttle mission modernization plan called FADS (Flight Analysis and Design System). CDC will install a distributed network, using off-the-shelf computer hardware and software, as well as providing support services to the Johnson Space Center in Houston, TX.

6. CDC Organization

CDC is organized into two business groups: the Information Systems Group and the Information Services Group (see Exhibit CDC-3). Within the Information Systems Group are three divisions: the Government Systems Division, Computer Products Division, and the Empros Divi-

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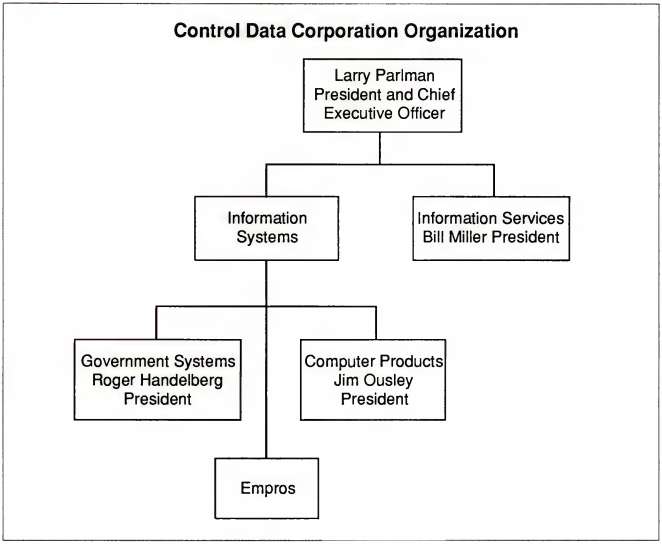
sion. Systems integration is performed at all CDC divisions on several different levels, whether as an embedded system on a military aircraft, or a full-scale computer systems integration for a commercial business.

EXHIBIT CDC-3



The Government Systems Division supplies computer systems, peripherals, software, training and related services to the U.S. Department of Defense, the National Aeronautics and Space Administration (NASA), and like agencies of U.S. allies. Although this division deals primarily with defense agencies, it is trying to broaden its scope to include some of the civilian agencies as well. The Computer Products Division provides computer systems and services to both commercial and federal clients worldwide. The Empros Division specializes in energy power systems and training simulators .

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The Information Services Group works primarily on providing marketing information, business management, financial management, and network information services to the commercial sector.

7. SI Objectives and Revenues

Control Data's systems integration objectives reflect the trend among equipment manufacturers to place greater attention on services. The company indicates that it participates in systems integration in response to customer requirements and expects its SI business to be self supporting. Follow-on hardware and software sales are of only secondary importance.

While CDC's systems integration revenue declined between 1989 and 1990, the percentage of overall corporate revenues increased, from 21% to 30%. The company expects continued growth in both the federal and commercial sectors, with its commercial business growing at a significantly higher rate. Commercial business revenue is expected to grow at an estimated 20% per year for the next five years. During the same period, the federal business is expected to grow at only 5%.

The company reports revenues of $600,000 for 1990. Of this, 30% is derived from federal and 70% from commercial. Seventy percent of CDC's revenues is derived by acting as a prime contractor. Twenty percent is derived from its role as a sub-contractor. An additional 10% is derived from CDC's participation in projects where the customer is the prime contractor.

The company indicates that it is currently experiencing gross profit margins of 5%-10% for systems integration services. However, like most companies in systems integration, it is experiencing an erosion of the profit margin. Like most companies, CDC realizes the greatest margins from development activities such as consulting, design, and software development.

Of CDC's commercial revenue, half is derived from its existing client base and half from new clients. Within the federal market, 70% is derived from new contracts.

8. Internal SI Capabilities Evaluation

The company currently has nearly 4,500 people assigned to support systems integration activities. Of the total, 3,200 are assigned full time to systems integration activities. The remainder are assigned to meet specific project or contract requirements.

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Of the total personnel supporting systems integration activities, 30% are associated with systems development and 20% are associated with project management. Management and planning, administrative support, and hardware selection each represent 10% of the staff. The company reports that 17% of the staff are devoted to sales.

As with most companies, some activities are centralized and some are decentralized. Marketing, account management, and administrative functions, such as legal, are centralized. Activities that relate directly to performing customer work are decentralized. The company reports that the same basic structure applies to the federal and commercial sectors.

9. SI Strategic Alliances

While CDC has internal capabilities in most technical disciplines, the company does have a formal program of alliances. In the short term, CDC's alliance program is geared to provide products and services to CDC that it can then deliver as a complete solution. In the longer term, the company expects to involve its alliance partners more directly in customer contract activities.

The company has both long-term alliances and those established to meet a specific short-term need. Longer term alliances have been established to meet hardware and system software requirements. Application software needs are met through short-term alliances.

The company notes the following alliances:

- MIPS Compiler Systems
- Silicon Graphics
- Lynx
- Micro Focus
- Kuch & Associates

10. SI Marketing Strategy

As noted in Exhibit CDC-3, the company targets several specific vertical markets. It does not expect this to change. These markets were selected based on CDC's knowledge of the business, growth potential, and the overall competitive environment.

The company pursues a fairly traditional approach to marketing. The majority of CDC's marketing efforts are directed toward seminars, trade shows, direct mail, and client referrals. Only selected advertising is done. As with most companies, client referrals are valued highly.

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Approximately 30% of CDC's federal and 50% of its commercial contracts result from client referrals. About 50% of contracts for each sector result from responses to requests for proposal. An additional 20% of commercial contracts result from proactive lead generation.

As shown in Exhibit CDC-4, CDC competes with major vendors in both the commercial and federal sectors.

EXHIBIT CDC-4

Key SI Competitors

Commercial	*Federal*
Andersen	EDS
EDS	CSC
IBM	IBM Federal

The company believes that there are a number of areas where its proprietary technology provides a competitive advantage. These include technologies related to disk array, engineering design management, archive and storage arrangement, and heterogeneous networks.

11. SI Customer Base

As with other companies, CDC reports there is considerable difference between the size of contracts in the commercial and federal sectors.

The value of commercial contracts range from $6-$8 million. Federal contracts average approximately $100 million. For both the commercial and federal sector, equipment represents approximately 40% of the contract value, packaged software and professional services each represent about 30% of the total value.

The revenue split between centralized and decentralized systems follows the industry trend toward downsizing. Approximately 30% is for mainframe-based systems and 70% is for distributed systems.

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The company provides the following examples of the type of contracts currently active.

- Canadian Government - Defense communications system
- U.S. Government - Army Corps of Engineers Automation Project
- U.S. Government - CANTASS Anti-Submarine Warfare System
- U.S. Government - AWACS Air Force Early Warning and Control System
- U.K. Government - National Electric Utility Grid Control
- Tennessee Valley Authority - Network and mail integration
- Minnesota State Lottery - Statewide automated lottery system

12. Summary and Future Directions

Control Data has focused on high-performance computing to develop its systems integration business. This has been productive for two reasons:

- First, it capitalizes on internal expertise and market reputation which CDC has acquired in this area as a result of its Cyber line of high-performance products.
- Second, it focuses CDC's resources into a market segment that many other integrators have not attempted to service. CDC has, therefore, enjoyed a good market share in this area.

Since SI is becoming a larger share of total corporate revenues at CDC, reflecting an increased interest in the services market, CDC will have to expand into other sectors to continue to strengthen its position in the SI market. It needs to creatively leverage its strong position in the information and business services market into systems integration engagements in order to remain a strong systems integrator. CDC, in effect, has to create a specialty integration market in this area, just as it has in high-performance computing.

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COMPANY PROFILE

Coopers & Lybrand

1. Key SI Contacts

Samuel Ruello
Vice Chairman
Coopers and Lybrand
1251 Avenue of the Americas
New York, NY 10020

2. Description of Principal Business

Coopers & Lybrand (C&L) is a private firm of accountants and technical/engineering advisers that provides a wide range of accounting and audit, professional services, and management consulting to business, industry, and government. C&L's management consulting services unit also provides systems integration services, which are described in this profile.

C&L declined to disclose any revenue data, noting that C&L does not track SI revenues separately at this time.

3. Competitive Position

C&L gains a competitive edge in the availability of highly marketable and specialized capabilities within the organization. Some of these capabilities are:

- A full systems design, development, and implementation capability using CASE and advanced project management techniques
- A wide range of technical and advisory industry skills developed through C&L's long experience as an auditing and management consulting firm
- Expertise in connectivity solutions—client/server and other distributed processing technologies
- Architecture reworking to modernize applications
- Data base expertise, especially in relational systems
- Network management skills
- Expertise in advanced technologies and applications, especially in image processing/multimedia, artificial intelligence, and object-oriented programming systems

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One characteristic of any vendor growing out of an accounting/auditing firm is the conflict that arises when an auditing firm decides to compete with its clients.

4. Markets Served

C&L's primary SI targets are vertical markets in which it has developed special expertise. Exhibit C&L-1 lists C&L's primary target industries.

EXHIBIT C&L-1

C&L's Target Market Opportunities

- Vertical markets only
  - Manufacturing
  - Telecommunications
  - Retail and distribution
  - Financial services, especially insurance and investment
  - Health care
  - Federal government

In addition, C&L focuses on geographically centered markets such as oil and gas in the southwestern United States and higher education in the Boston metropolitan area.

As a conservative business entity, C&L looks first for clients in areas where C&L has recognized industry expertise. Secondly, it looks for requirements with the greatest market potential.

5. Recent Events

With its background as an accounting/auditing and management services consulting firm, C&L is reluctant to disclose its work for clients.

In 1989, C&L acquired Computer Assistance, Inc. of Hartford, CT. This acquisition will increase C&L's strength in the SI marketplace.

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6. SI Organization

C&L conducts all its SI operations under the management of Samuel Ruello, Vice Chairman and head of C&L's Management Consulting Services unit. Commercial and federal SI efforts are separated, under George Van Ness and Phil Odeen, respectively. C&L's organizational structure is deeply matrixed, with geographic regions managed by partners in charge of each region. Other managers head areas of specialized industry expertise. Exhibit C&L-2 illustrates C&L's regional/industry/functional management matrix.

EXHIBIT C&L-2

C&L's SI Management Matrix (Partial)

Regions	Industries	Functions
Northeast	Manufacturing	Business strategy services
New York Metro	Financial services	Information technologyservices
Atlantic	Insurance	Resource and enterprise services
Midwest/Central	Health care	
Southwest	Retail and distribution	
West	Telecommunications	
	Federal	

Although separately managed, both the commercial and federal SI operations follow the same approach to management of SI businesses, as presented in Exhibit C&L-3.

7. SI Business Objectives

C&L's business objectives in pursuing SI work are listed in Exhibit C&L-4. It is interesting to note that C&L ranked all the objectives as primary and none as secondary.

The objectives listed above are very much in line with the pragmatic nature of C&L's background and reflect the fact that C&L does not pursue SI business as an adjunct to another business.

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EXHIBIT C&L-3

Centralization/Decentralization of SI Business Functions—C&L

Responsibilities	Commercial	Federal
Strategy, long-range planning	B	B
Marketing and promotion	C	C
Account management/sales	D	D
Contract review/approval	C	C
Project management/control	D	D
Implementation/development	D	D
Hardware/software acquisition	C	C

C=Centralized, D=Decentralized, B=Both

EXHIBIT C&L-4

C&L's Stated Business Objectives

Objective	Primary/Secondary
Revenues/profits resulting from SI work	Primary
Response to customer demands	Primary
Control of account base	Primary
Strengthen C&L's non-SI business	Primary

8. SI Capabilities Evaluation

C&L offers a wide range of SI services that includes: business and management consulting; systems design, development, and implementation; education, training, and documentation; selection, evaluation, and acquisition of off-the-shelf and custom equipment, software, and telecommunications facilities and services; network management and operations; and software maintenance. C&L rates itself in each area as shown in Exhibit C&L-5.

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EXHIBIT C&L-5

SI Business Capabilities/Products Evaluation--C&L

Capability	Strength	Alliance
Business consulting	High	No
Design methodology	High	No
Design/integration	High	Yes
Project management	High	Yes
Software development	High	Yes
Education/training/documentation	Medium	Yes
Packaged applications software	High	Yes
Packaged aystems software	High	Yes
Standard computer hardware	Medium	Yes
Custom computer hardware*	Medium	Yes
Communications hardware*	Low	Yes
Network management/operation	Low	Yes
Software maintenance	High	Yes

*Capability only—no products

It is worth noting that C&L offers no equipment service and repair at this time; thus, it is not listed in Exhibit C&L-5. It should also be noted that C&L rates its in-house capability in several areas as "low," thus increasing the value of its alliances in those areas. In the critical management services/management consulting areas, however, C&L rates the values of its capabilities as high.

C&L is currently a relatively small SI services vendor. Although C&L did not offer any revenue data, INPUT estimates C&L's total SI business at less than $50 million. INPUT expects C&L to continue to follow a conservative path toward growth in the SI business, as it would in its management consulting business. Thus, its growth will be slow but steady—based increasingly on demonstrated successful completion of SI projects.

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9. Strategic Alliances

C&L uses strategic alliances to buttress its areas of competitive weakness. Thus, in C&L's business consulting and project management areas, C&L feels no need for cooperative partnerships. In other areas, however, C&L clearly pursues coverage that permits it to propose a total system solution (except for equipment service and repair services).

In general, C&L's strategic alliances provide:

- Complementary skills
- Computer and communications equipment
- Software packages
- New or advanced technology
- New markets, through lead sharing

Thus, through its alliances C&L gains a competitive advantage.

C&L uses both ad hoc and long-term arrangements. Arrangements with hardware and software vendors tend to be long-term and complementary; they may include lead generation, access to software, and training. Some examples of strategic alliances used by C&L are identified in Exhibit C&L-6.

EXHIBIT C&L-6

Limited Sample of C&L's SI Alliances

Company	Purpose of Alliance
IBM	Business partner
DEC	Business partner Electronic data interchange
Pansophic	CASE tools
Cadre	CASE tools
J.D. Edwards	Packaged software, training, demonstration
Software 2000	Packaged software, training, demonstration
Various data base vendors	Packaged software, training, demonstration
FILENET	Image processing technology
Wang	Image processing technology

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10. SI Capabilities Summary

C&L offers a complete set of SI services capabilities, with the exception of equipment service and repair.

C&L's strategic alliances strengthen its areas of weakest capability. They are well-chosen to strengthen C&L's services offerings, increase the scope of its product offerings, and generally improve C&L's competitive advantage in the SI market place. C&L's areas of greatest weakness are in the evaluation of communications hardware and in network management and operations. In both areas, however, C&L has arranged for supporting alliances.

C&L's chosen market focus is in certain vertical industries. C&L has developed alliances with equipment vendors (IBM and DEC) to provide equipment; alliances with other (primarily software) vendors provide strength in technological areas where C&L does not have products or experience and expertise.

By focusing on selected vertical industries, C&L can now compete in its areas of greatest strength. As it gains experience, however, in other areas of the SI market, INPUT expects C&L to increase both the dollar value and the breadth of its participation in the SI market.

11. SI Marketing Strategy

C&L's marketing strategy is tightly focused on vertical industries in which C&L has a primary expertise (listed in section 4, Markets Served, above). C&L has developed its SI marketing emphasis as a response to the following perceived industry trends:

- A need to transfer project risk to an outside entity
- A need to increase control of systems development projects
- A need to reduce life cycle costs (and short-term costs)
- Increasing complexity of computer equipment, software, and networks

With its highly matrixed organization (described in section 6, SI Organization, above), C&L has ensured that all its selected industry markets receive the same level of service from the functional areas that support its SI operations. Also, adding additional vertical industries to its target markets will not require great changes to C&L's organization.

- Competitors - C&L competes with the vendors identified in Exhibit C&L-7.

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EXHIBIT C&L-7

C&L's SI Competition

Commercial Market	Federal Market
Big 6 Accounting Firms	Big 6 Accounting Firms
CSC	CSC
EDS	EDS
Hardware vendors	Hardware vendors
	Software vendors

C&L has targeted vertical industries in which it can use the expertise it has developed in its professional services consulting history. It should be noted that others of the Big 6 claim to have similar expertise in some of the same industries.

- Positioning - C&L positions itself as a full-service firm. To its clients, C&L wants to provide all SI services, including facilities management. It is worth noting that C&L is a professional services firm with strong management consulting capabilities, and not a producer of computer equipment or software. With its alliances, however, C&L can provide all the services it chooses to propose.

- Promotion - C&L uses all normal forms of promotion, including telemarketing, other than television advertising and advertising in general business publications. C&L finds word-of-mouth referrals and telemarketing most effective. In both commercial and federal SI marketing efforts, C&L gains more than half its new business from its existing customer base. About one-third of its new business is gained from a combination of telemarketing and leads from its alliance partnerships.

12. SI Customer Base

Consistent with its background as a conservative accounting/auditing firm, C&L declined to provide any data on SI revenues or project history. It is worth noting, however, that in the vertical markets that C&L pursues, 70% of C&L's SI projects concern mainframe-based systems; 30% of projects concern distributed systems. Also, more than half of C&L's SI contract value derives from professional services; 15% derives from equipment, and 25% derives from packaged software.

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13. Summary and Future Directions

C&L's greatest strengths lie in its management analysis capability and in its great expertise in its target vertical markets. If it selects its target projects carefully, C&L should easily succeed in the SI market. C&L's areas of greatest strength are in the management consulting and analysis areas. C&L has developed strategic alliances with producers of a wide range of computer equipment and software that permit C&L to act as a single-source SI services vendor.

C&L's self-described current weakness in the areas of custom computer hardware, communications hardware, and network management/ operations are all easily overcome by carefully choosing a complementary alliance partner. Thus, INPUT expects that C&L will more effectively compete in the SI market than its own conservative ratings would suggest.

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COMPANY PROFILE

Digital Equipment Corporation (DEC)

1. Key SI Contacts

Russ Gullotti
Vice President
Corporate Services
Digital Equipment Corporation
Nine Executive Park Drive
Merrimack, NH 03054-0430

2. Description of Principal Business

The Digital Equipment Corporation (DEC) is the best known minicomputer manufacturer in the U.S., offering a wide range of equipment and software, ranging from small microcomputers suitable for laboratory data collection and analysis, to larger midsize machines and mainframes often used to support departmental information systems along with office automation capabilities, including electronic mail.

Also, DEC provides the following services:

- Computer services (facilities management, disaster recovery, and hardware rentals)
- Professional services (network planning and implementation, site planning, education, training, and systems integration)
- Financial services (principally leasing)
- Systems integration (program management, custom hardware and software, and third-party hardware and software)
- Product services (both DEC and non-DEC)

Based on total 1989 revenues ($13 billion), DEC is the second-largest computer vendor in that industry.

Without question, DEC holds the leadership position in midrange systems. Over the past five years it has capitalized on its strengths in departmental and distributed computing, enabling it to expand beyond its traditional emphasis on scientific and technical computing to include the general office and administrative applications. Over the past few years, DEC has shifted its focus from satisfying minicomputer-based departmental information requirements to providing mainframe-based enterprise information capabilities.

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Although DEC operates in virtually all industry sectors, primary industry markets for DEC include telecommunications, education, federal government, aerospace, automobile manufacturing, banking and finance, health care, and process manufacturing.

In 1989, DEC was a $13 billion business overall. INPUT conservatively estimates DEC's overall 1989 U.S. SI business at about $333 million. INPUT's analysis suggests that a figure closer to $1 billion may well represent DEC's Enterprise Integration Services group's worldwide revenues, which include revenues from non-U.S. operations and from professional services not included in INPUT's current definition of SI services.

INPUT believes it to be accurate to divide DEC's business revenues between commercial and federal business at roughly 84% and 16%. Thus, INPUT estimates that DEC's commercial and federal SI revenues for 1989 were approximately $230 million and $45 million, respectively, as shown in Exhibit DEC-1.

EXHIBIT DEC-1

DEC Systems Integration Revenues, 1989

Business Component	$ Millions
Federal	45
Commercial	230

3. Competitive Position

DEC, as a major minicomputer vendor, has been offering a systems-oriented (hardware and software) solution to its customers for many years. This sales position, coupled with its internal and custom software development activities, made the move into large-scale SI efforts a natural undertaking. DEC is aggressively pursuing SI business in the hundreds of thousands to multimillion-dollar range and sees as its competitors IBM, Andersen Consulting, and EDS. It competes with these vendors in both its federal and commercial business pursuits.

In addition to DEC's general financial health, DEC's primary competitive advantage is its integrated computer architecture, which permits modular systems expansion and software compatibility across hardware/software platforms. In addition, DEC benefits from an extensive library

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of third-party and in-house-developed applications software and the growing use of its equipment in general-purpose departmental environments. Additional advantages include:

- An integrated office automation offering, All-In-One
- Sound fiscal management and an enthusiastic user community.

DEC continues to seek an increasing presence in the worldwide SI market; it accomplishes this by increasing the number of its target industries and increasing the scope of its strategic alliances.

4. Markets Served

DEC markets its products and services to worldwide vertical industry markets; however, Digital has chosen to focus its Enterprise Integration Services efforts in the following vertical markets:

- Process industries
- Discrete manufacturing and engineering
- Finance and services industries
- Telecommunications and networking
- Federal agency requirements

The primary motivation for participating in these markets is existing customer demand. INPUT expects that the range of industries serviced will grow as DEC sees opportunity or loss of account control in any particular industry. In addition to the markets cited by DEC, it appears that DEC will continue to take a strong position in engineering and scientific, artificial intelligence/expert systems, and office automation cross-industry sectors for both SI and non-SI opportunities. Exhibit DEC-2 summarizes DEC's primary SI market opportunities.

EXHIBIT DEC-2

DEC SI Target Market Opportunities

Vertical	Cross-Industry
Finance & Services	Office Automation
Process Manufacturing	Artificial Intelligence
Discrete Manufacturing	Engineering and Scientific
Federal and State Governments	
Telecommunications	

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As a manufacturer itself, DEC brings to its manufacturing-oriented systems integration efforts experience and understanding that are very difficult for a purely professional services contractor to obtain.

5. Recent Events

In early 1989, DEC formed the Enterprise Integration Services (EIS) Group, bringing together 18,000 employees who had been doing SI work and putting them into a single organization under a corporate vice president, EIS Group VP, Russ Gullotti.

In 1990, DEC EIS established its Digital Service Alliance (DSA) Program. Under the DSA Program, DEC enters into strategic alliances with other vendors whose capabilities complement DEC EIS' with respect to various potential clients' SI requirements. In addition:

- In January, 1988, DEC and Apple declared a joint venture that has subsequently provided a solid architecture linking their respective products.
- Over the past few years, DEC has invested significant amounts in hiring experienced consultants and professional services personnel from the Big 8 and other professional services companies whose primary business has been in the "solution" selling and delivery businesses.
- In March, 1989, DEC won one of its largest SI contracts for automation of a Boeing sheet metal fabrication facility.
- Over the last year, DEC established a set of alliances with companies that have manufacturing consulting capabilities. Included among these are Deloitte Touche, A.D. Little, Andersen Consulting, Ernst & Young, and Price Waterhouse.
- In 1989, DEC won the network management component of the Kodak outsourcing contract. DEC is clearly a leader in network integration and management; this contract was a major event in the 1989 information services market.
- In 1990, DEC won a major CIM contract to rebuild the production and business planning systems for Nissan's Smyrna, Tennessee truck plant. DEC also won multimillion dollar SI contracts at BIMCO, Deutsche Telepost, Canada Post, Bankers' Trust, and Tyson Foods.
- In November, 1990, DEC EIS formed a new Consulting Services Business unit as a direct response to the demand for high-level consulting coming from DEC customers and as a key component in DEC's effort to enhance the business partnership with its customers.

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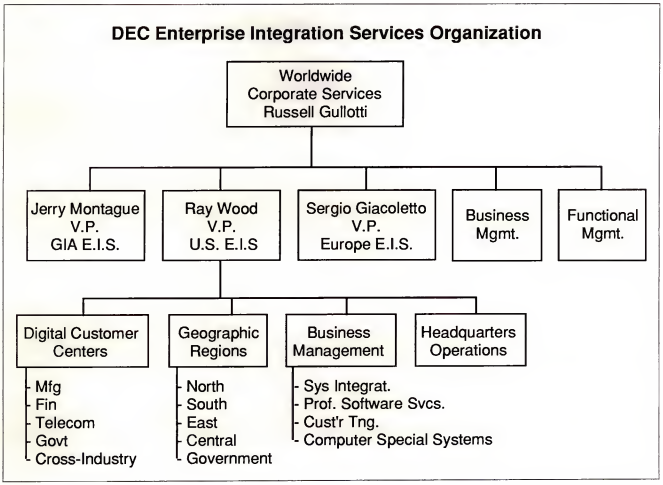
- In November, 1990, DEC announced that it was proceeding with a $60 million SI effort for an unnamed petrochemical process manufacturer in England.

- In December 1990, DEC announced that Russ Gullotti would manage a combined services organization consisting of both Customer Services and EIS organizations.

6. SI Organization

DEC has traditionally operated using a matrix organization; the EIS group is no exception. Exhibit DEC-3 illustrates the DEC EIS organization.

EXHIBIT DEC-3



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- The Digital Customer Centers (DCCs) provide a full range of support services to the field sales organization. These centers are industry focused and include:
  - Application Centers for Technology (ACTs), which provide focused industry applications and emerging technology support expertise
  - Management consulting capability
  - Systems integration resources
- The geographic regions are responsible for managing EIS support to the geographically dispersed product sales organization.
- Business Management focuses on service or product excellence. For example, the SI Business Manager is responsible for methods, tools, and training for SI resources.

DEC has strong ties to the manufacturing industries—particularly automotive, aerospace, and process. It has historically sold at the department level in engineering and on the plant floor. Because this is such an important part of its business, DEC has established three DCCs for manufacturing. They are:

- Detroit, Michigan—focus on automotive applications
- Santa Clara, California—focus on aerospace
- Atlanta, Georgia—focus on process manufacturing

Other DCCs within the United States are:

- Washington, D.C.—focus on government systems
- Landover, Maryland—focus on telecommunications and marketing, and cross-industry applications
- New York City—focus on finance and service industries

7. SI Business Objectives

Russ Gullotti, DEC's Vice President in charge of all DEC's Corporate Services, including the Enterprise Integration Services (EIS) Group, announced in November, 1990, that DEC's objective in the SI market place is to become the "#1 world class systems integrator," that is, to be the leading systems and support integrator, encompassing the full range of business needs in an integrated, multivendor, enterprisewide environment.

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As a result of this announcement, DEC clearly continues the shift in its approach to meeting its customers' needs from hardware and software solutions, to enterprisewide systems and services solutions. Likewise, for the DEC EIS, SI services are no longer an adjunct to the sales and maintenance of computer equipment and software. SI services have become the primary focus of the organization.

Against an SI industrywide growth forecast of not more than 20% per year, DEC EIS is planning on 25% growth.

8. SI Capabilities

DEC offers the full range of SI services. Consulting, design/integration, project management, hardware, communications products, systems software, etc. In particular, DEC has a wide range of specific telecommunications-oriented SI capabilities. Its strong financial position and growing capability to understand the risk management associated with SI make it a credible competitor. INPUT evaluates DEC as follows:

- Business Consulting—At one time a weak area, DEC is investing significantly to increase its capabilities in this field. Its Enterprise Planning & Design Services are focused on enterprise planning and the identification of strategic opportunities. Partners and alliances are used in this area, but DEC continues a campaign to acquire this skill by hiring or allying with experienced practitioners to operate in both a marketing and a consulting capacity.

- Design Integration—DEC has established a reputation for being able to integrate its offerings with those of other computer hardware and communications equipment manufacturers. This is one of DEC's real strengths. In addition, the unified nature of DEC's own product architecture is an advantage. Integration at the network level is DEC's major strength.

- Project Management—INPUT believes that DEC has demonstrated strong skills in the project management area. DEC has also invested heavily in developing a program management approach that should strengthen its capabilities in this area for jobs like the Boeing project.

- Software Development—DEC has extensive (perhaps the most) experience in developing applications software for minicomputers. Even though in-house expertise might be limited in some vertical markets, DEC's strong network of alliances and third-party developers has produced a full range of applications for DEC platforms.

- Education, Training, and Documentation—DEC has a highly developed system for education and training, and is probably better than most at being able to deliver this service flexibly.

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- Packaged Applications Software—There are hundreds of third-party suppliers that develop software for the DEC environment. INPUT believes that DEC has strengthened its ability to create continued interest in developing packages for its platforms.

- Standard Computer Hardware—DEC's integrated VAX/VMS architecture and workstation line give DEC a complete offering in the on-line applications systems market.

- Communications Hardware—DEC's line of communications equipment is targeted primarily at DEC proprietary environments. DEC, however, provides communications systems software that permit DEC systems to communicate effectively with almost all standard network environments.

- Network Management and Operations—DEC is a leader in managing worldwide networks and providing network management software. Although DEC has, in the past, dealt mostly with homogeneous DEC networks, INPUT believes that DEC's commitment to communications standards and its increasing presence in the SI market will force DEC to deal more often with heterogeneous communications networks.

- Service and Repair, Software Maintenance—This is another of DEC's strengths. Through its Vendor Equipment Services offering, DEC is servicing heterogeneous environments for 14,000 products and applications representing over 800 vendors.

9. SI Strategic Alliances

DEC EIS has entered into strategic alliances with other SI services vendors whose capabilities complement DEC EIS'; these alliance agreements also allow DEC EIS to respond to clients' solicitations much more rapidly, eliminating the normal search time for matching skills and availability. Current strategic alliances are listed in Exhibit DEC-4.

DEC uses alliances in virtually all aspects of its SI business. Key alliances are performed within the Service Alliance Program and are negotiated on a supplier-by-supplier basis. In DEC's own words, the program is presented to the customer environment as follows: "Building the best solution for a customer's enterprisewide project requires many components. Creating and delivering that solution may require the use of third parties."

The program provides for formal relationships with leading service suppliers in selected technologies, industries, and application areas and it enhances the breadth, depth, and capacity of DEC total solution services. It conveys to customers that DEC can be the single source for their companywide service needs.

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INPUT notes that DEC also has hundreds of alliances for applications software and other services.

EXHIBIT DEC-4

DEC
Limited Sample of SI Alliances

Alliance	Purpose
Andersen Consulting	Distribution and Logistics industries
Apple	Computer-integrated manufacturing (CIM)
CACI, Inc.	CIM
CSC	CIM; Distribution and Logistics industries telecommunications
Deloitte and Touche	CIM; Discrete Manufacturing; Process Manufacturing
Ernst & Young	Health Care
A.D. Little	CIM; Chemical; Pharmaceutical industries
Morrison-Knudsen Engineering	Computer Integrated Manufacturing
Price Waterhouse	F&A; Process Industries; EDI
SHL Systemhouse	CIM

Other alliances may be formed on a project-by-project basis.

10. SI Capabilities Summary

DEC has a full array of capabilities to compete in the SI marketplace.

Major strengths are the breadth and depth of DEC's alliances and increased customer orientation. INPUT believes that DEC has shown itself to be capable of managing very large projects and of managing risk.

A former DEC weakness was a perceived lack of vertical industry expertise outside the scientific/technical areas. However, DEC's many alliances with partners that provide the needed expertise in other industries, combined with DEC's focused Digital Customer Centers, are overcoming this weakness.

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Exhibit DEC-5 summarizes INPUT's current assessment of DEC's SI capabilities.

EXHIBIT DEC-5

INPUT's Evaluation of DEC's SI Capabilities

Strengths	Weaknesses
Integrated VAX/workstation architecture	Perceived lack of ability in non-targeted vertical industries
Selection, acquisition, and maintenance of third-party equipment	
In-house technical expertise	
Geographic coverage	
Depth/breadth of alliances	

11. SI Marketing Strategy

DEC has increasingly broadened its SI services marketing strategy to include larger and larger projects in its worldwide markets. DEC now sees itself as potentially the leader in the worldwide SI market; DEC intends to achieve that position through growth resulting from performance. As a systems integration services vendor, DEC can propose combinations of DEC and other manufacturers' equipment and software in whatever combination best meets the clients' needs.

DEC has described its strategy very simply as the following:

- Build a foundation
- Target the market
- Develop service alliances
- Deliver globally

DEC has built its foundation: the DEC EIS organization. DEC has targeted its desired market: all vertical industries worldwide. DEC has developed a wide range of alliances with complementary services vendors that permit DEC to propose all required SI services. DEC now expects to grow through its performance in the worldwide SI market.

- Competitors. In prior years DEC has declined to identify its competition as a matter of policy. This year, however, DEC identified IBM, Andersen Consulting, and EDS as its major competitors in both the

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commercial and federal SI markets. It should be noted that DEC, as other SI services vendors, will compete with another vendor and then later join in an alliance with that vendor for a different project.

- Positioning. DEC has positioned itself as the leading worldwide provider of network computer systems by offering a full range of computing solutions for integrating the entire enterprise from the desktop to the data center. It leverages its use of alliances much more effectively than many of its competitors.

- Promotion. DEC utilizes all forms of promotion with the exception of direct mail and television advertising in the marketing of systems integration services. Clearly, the company feels that the most effective promotional device is the referral. DEC uses its internal worldwide network of more than 15,000 nodes and 70,000 terminals to validate its experience in networking. Other references include computer-integrated manufacturing (CIM) applications; on-line library data base networks; banking and insurance distributed processing systems; and large-scale health care systems integration projects.

DEC also maintains a responsive consultants' liaison department to positively influence independent consultants hired by companies to recommend project bidders.

DEC EIS is now pursuing a growing range of SI opportunities that can be satisfied by any combination of equipment, software, and services that it can provide. Currently, in both the commercial and federal markets, DEC EIS derives the distribution of revenue from its SI contracts presented in Exhibit DEC-6.

DEC-6

Distribution of SI Revenue by Class of Service/Product

Class of Service/Product	Percent
DEC hardware & software products	45
Third-party products and services	15
Digital services	40

In addition, DEC strategy is now to provide a complete solution within a vertical industry, rather than trying to compete for small pieces of many requirements. To this end, its strategic alliances form partnerships with services vendors who can help DEC provide complete solutions.

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12. SI Customer Base

INPUT estimates that DEC has undertaken more than 800 SI projects over the past several years ranging in value from hundreds of thousands of dollars to over $250 million, with an average between $5 million and $10 million.

Several SI efforts undertaken by DEC, for which the dollar values are known to INPUT, are shown in Exhibit DEC-7.

DEC-7

Examples of DEC SI Projects

Company	Project Description	$ Millions
Firestone	Computer Integrated Manufacturing (CIM)	21.0
HFSI	Paperless factory	10.0
Nissan	Paperless factory	8.0
Boeing	Sheet metal plant automation	52.0
BIMCO	International shipping network	100.0
Deutsche Telepost	Telecommunications Integration	100.0
Tyson Foods	Logistics	9.2

DEC's SI projects have encompassed applications ranging from computer-integrated manufacturing to inventory management and network integration.

In addition, major projects have been undertaken recently for the Canada Treasury Board and W.H. Smith (a London retailer).

13. Summary and Future Directions

DEC's strengths include its ability to manage projects involving distributed processing, networking, and communication across various vendors' processors. Network design and management capabilities are crucial to being a successful integrator; DEC scores high in this area.

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Additional strengths include:

- Communications hardware and software products that enable DEC hardware to communicate with non-DEC computers
- Strong account presence through its worldwide service staff
- Financial strength, internal technical skills, and capability to manage larger-scale projects and their associated financial risks
- A rich portfolio of internally developed and third-party applications software product offerings

DEC has few perceived weaknesses, other than a potential lack of objectivity in approaching the hardware and software component issues of the solution.

INPUT believes that DEC will continue to move toward a fully matrixed, decentralized, organizational structure for administration, sales, and marketing of its SI activities. In addition, INPUT anticipates that DEC will continue to target large-scale, international, and publicly visible SI projects to enhance the reputation of its Enterprise Integration Services offering, and initiate more aggressive education of internal field personnel to help promote the SI strategy.

In summary, DEC's prospects in the SI marketplace look bright.

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COMPANY PROFILE

Electronic Data Systems (EDS)

1. Key SI Contacts:

Corporate Business Development
Gary J. Fernandes
Senior Vice President

Manufacturing, Warehousing and Distribution Segment
Paul Chiapparone
Senior Vice President
Hank Johnston
President, Manufacturing and Distribution Services Division

Federal Government Segment
G. Stuart Reeves
Senior Vice President

International and Global Industries Segment
Mal Gudis
Senior Vice President

2. Description of Principal Business

Electronic Data Systems (EDS) was originally founded in 1962 by Ross Perot to provide systems operations services to insurance companies, government-funded health insurance programs, and financial institutions. Today it provides systems operations, processing services, professional services, and systems integration services to nearly all vertical industries and to the federal government. In addition, EDS may act as a fiscal agent for a client, taking full responsibility for data processing as well as other administrative duties such as paying and processing insurance claims.

EDS is among the leaders in providing systems integration to the federal government and entered the commercial systems integration market in the early 1980s, gaining experience and a substantial lead in this area.

EDS was acquired by General Motors in 1984 and is operated as a wholly owned subsidiary. EDS provides virtually all information processing services to General Motors.

3. EDS Competitive Position

EDS is the largest systems operations and processing provider in the world and had worldwide 1989 revenues of $5.47 billion and net income of $435 million. Approximately 55% of EDS's revenues are from captive GM business and the remainder is from systems operations and other professional services for outside clients.

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EDS has a strong set of information services capabilities and resources—including consulting, development, systems integration, and systems operations. Its operational data processing experience, including developing and operating large and small data centers, makes it a real "pro" in the efficient and cost-effective use of technology. Its systems operations experience with insurance companies and financial institutions provides it with applications knowledge of these industries. The assumption of all information systems responsibility for General Motors provides it with real business experience in the manufacturing, retail, distribution, and networking areas. And its alliance with GM Hughes provides it with aerospace industry knowledge.

The purchase by GM further adds to EDS's strengths. It provides huge financial resources to support bids, on the largest opportunities and the buying power of one of the nations largest corporations. This buying power will provide it with other vendors' products at the lowest possible price and will result in very competitive pricing.

4. Markets Served

EDS recently restructured its organization and has organizations that focus on virtually all vertical markets. Its historical focus has primarily been the following vertical markets:

- Federal government
- State and local governments
- Banking and finance
- Insurance
- Manufacturing

While EDS's expertise is aimed primarily at vertical industries, the company has targeted two key cross-industry markets: engineering and networking—both areas where the company has gained a great deal of experience through its work at GM.

To become a major systems integrator, EDS has targeted the federal government, discrete and process manufacturing, aerospace, and retail distribution vertical markets. It is also making a major thrust at expanding this capability into the international market. (See Exhibit EDS-1). Under it new organizational structure, EDS will focus on all vertical markets.

EDS's 1989 revenues, including captive GM revenues, were distributed as shown in Exhibit EDS-2.

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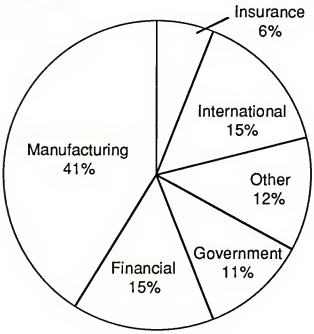
EXHIBIT EDS-1

SI Vertical Market Focus—EDS

- Federal Government
- Discrete Manufacturing
- Process Manufacturing
- Retail and Distribution
- Aerospace

EXHIBIT EDS-2

Revenue by Market Sector



1989
$5,466.8 million

5. Recent Events

In November 1987, EDS entered an agreement with Tandem Computers to jointly develop and market products and services to help manufacturers connect and integrate multivendor business, engineering, and factory control systems.

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During 1987 EDS began negotiations to acquire MTech and the servicing responsibilities for the third-largest ATM (automated teller machine) network in the U.S. The acquisition was completed in 1988. In 1987 EDS also acquired M&SD Corp, a supplier of telecommunications services and equipment.

In 1987 Perot sold his interests in GM-EDS and resigned from the GM Board of Directors because of fundamental differences he had with GM's management style and system. At that time Perot agreed that he would not compete with EDS for profit for a three-year period. During 1988 Ross Perot formed a new firm, Perot Systems, focused on systems integration and a direct competitor to EDS.

In March 1989, EDS entered into negotiations to purchase 20% ownership of National Advanced Systems (NAS), the other 80% to be held by the Japanese computer manufacturer, Hitachi. This investment in the company now called Hitachi, USA provides EDS with a low-cost source of computer hardware and additional leverage to gain favorable discounts from other equipment vendors.

In early 1990, EDS entered into a potential multibillion-dollar, 10-year accord with Texas Air Corporation. EDS is investing $250 million in the airline's System One computerized reservation subsidiary for 50% ownership. Included is EDS's management of four data centers and control of 2,200 Texas Air employees.

Recent developments are summaried in Exhibit EDS-3.

EXHIBIT EDS-3

Recent Major Developments

- Tandem CIM alliance
- MTech and M&SD acquisitions
- HDS minority ownership position
- Texas Air accord

6. EDS Organization

In late 1989, EDS announced major changes to its organization. Eight of its senior executives were given oversight for eight major business segments and were also assigned to the new Leadership Council. The Council has been established to provide a high-level focus on strategic planning.

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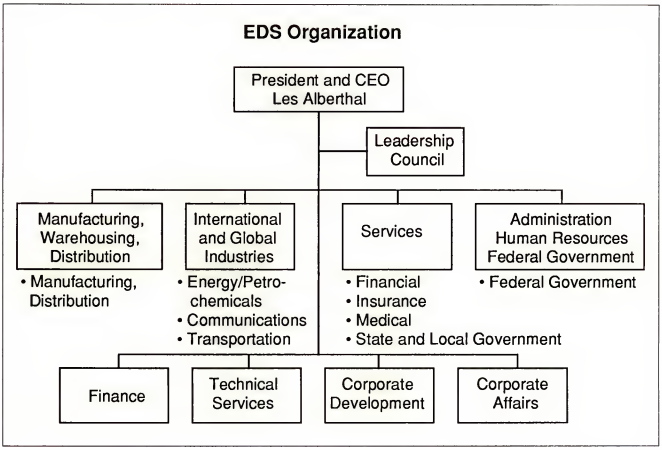
The reorganization also establishes a large number of business units (well over fifty), most with divisional status, with responsibility for specific market opportunities. Most of these organizations have a specific vertical industry market focus. Similar to its major competitors, EDS has recognized the importance of building solutions for each type of customer.

Exhibit EDS-4 depicts the new EDS organization and the eight major business segments. Vertical industry market responsibilities are also identified.

EXHIBIT EDS-4



In interviews with INPUT, EDS stated that it is in the systems management business and systems integration is an essential component of that business. It also stated that most of its employees have operational experience that can be applied to SI. INPUT's estimates of EDS's 1989 SI revenues are shown in Exhibit EDS-5.

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EXHIBIT EDS-5

EDS Systems Integration Revenues, 1989

Business Component	$ Millions
Federal	350
Commercial	150
Total	500

EDS has 60,000 employees worldwide. As mentioned above, many of these employees have skills and knowledge that can be applied to SI. INPUT has not attempted to estimate the number of personnel assigned to SI, although they are distributed among the various functional disciplines as shown in Exhibit EDS-6.

EXHIBIT EDS-6

Distribution of SI Personnel EDS

Capability	Percent	
	Commercial	Federal
Management, strategy, planning	3	1
Legal/contract administration	1	1
Project management	10	5
System development/ implementation	75	78
Hardware/software evaluation/ acquisition	10	10
Hardware engineering	0	0
Sales	2	5

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When interviewed, the EDS organizations that address most SI opportunities responded quite differently as to how they were organized to execute and manage SI contracts. This is illustrated in Exhibit EDS-7.

EXHIBIT EDS-7

Centralization/Decentralization of SI Business Functions Electronic Data Systems

Responsibilities	Commercial	Federal
Strategy and long-range planning	B	D
Marketing and promotion	C	D
Account management/ sales	C	D
Contract review/approval	C	D
Project management/ control	B	D
Implementation/development	B	D
Hardware/software acquisition	C	C
Systems operations	C	C

C = Centralized, D = Decentralized, B = Both

The Government Systems Group operates in a decentralized mode, with the exception of hardware and software acquisition and systems operations, which are controlled centrally. The commercial organizations have been more centrally controlled, with all activities except strategy and long-range planning, project management and control, and implementation and development controlled from Dallas. These three responsibilities were shared by Dallas and decentralized locations. INPUT believes that the major reason for the differences in these responses has been a result of the different customer requirements and the commercial organizations' proximity to EDS corporate headquarters.

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As EDS's new organization unfolds, with its focus on more autonomy and delegation of decision authority, INPUT anticipates that commercial organization will become much more decentralized.

7. SI Objectives and Revenues

EDS's business objectives are identified in Exhibit EDS-8. Management has set a goal of reducing its dependence on GM business to 50% by 1990. It is attempting to accomplish this by holding GM-derived revenues level, while continuing to increase traditional non-GM revenues by around 30%.

EXHIBIT EDS-8

EDS Business Objectives

- 50% of business from non-GM sources by 1990
- 80% renewal rate
- SI as a source of systems operations contracts
- Control of existing customer base
- Profitable SI business

EDS also has a business objective of maintaining a client renewal rate in excess of 80%. It is offering systems integration in response to its customers' demands, and recognizes it as a vehicle to attract new systems operations candidates and to maintain control over its existing customer base.

Finally, the company is looking to the SI business to earn a profit.

8. Internal SI Capabilities Evaluation

- Business Consulting—EDS has good consulting experience in the area of developing large projects. It has very good technical consulting capability based on its extensive systems operations experience. Vertical-industry business consulting capability should be particularly strong in its base businesses—process and discrete manufacturing, retail and distribution, aerospace, and networking—all areas of SI concentration. EDS' new organization should improve its knowledge of additional vertical industry markets.

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- Design Methodology, Design and Integration, Project Management, Software Development, Education, Training, and Documentation—Based on the experience it has gained both in its basic systems operations business and at GM, EDS is very capable in all of these areas.

- Packaged Application Software—EDS has developed and acquired a number of vertical market packages that it uses in its traditional business. Examples are The Insurance Machine™ for the insurance industry and Flagship™ for credit unions. It is not clear what role these products may play in SI-only, non-facilities-management projects. EDS indicated in its survey response that it would prefer to use all off-the-shelf products.

- Packaged Systems Software—The company prefers to use off-the-shelf products provided by other vendors.

- Standard Computer Hardware—EDS uses standard off-the-shelf hardware provided by other computer manufacturers. EDS will most likely incorporate more Hitachi/NAS products in its bids.

- Custom Computer Hardware—EDS's commercial systems integration organization indicates that it has some custom hardware capability, but it would clearly prefer to use off-the-shelf hardware.

- Network Management and Operations—EDS has extensive experience in developing and managing GM networks and its own network that supports its processing services capability. Today it operates one of, if not the largest, networks in the world.

- Service and Repair—EDS has moderate capability in hardware service and repair.

- Software Maintenance—The company has adequate software maintenance capability.

9. SI Strategic Alliances

EDS has a formal alliance program that generally operates on a contract-by-contract basis. Alliances exist with computer hardware manufacturers, other GM organizations, customers, applications software providers, and non-U.S. partners. Examples of these alliances are shown in Exhibit EDS-9.

Equipment alliances have been established with leading vendors, including IBM, AT&T, Tandem, DEC, Sun, and Apple. The Tandem alliance includes a strong focus on the manufacturing industry. EDS's alliance with GM Hughes is focused on factory automation and telecommunications applications that require satellite-based products and services.

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EXHIBIT EDS-9

EDS—Strategic Alliances

Equipment	Digital Equipment IBM AT&T Apple Tandem Sun
Systems software	Ameritech
CIM/satellite products and services	GM Hughes Electronics
International SI	Lucky-Goldstar Telefonica
Large retail bank processing systems	Norwest Corporation Banc One Corporation
Airline reservation systems	Texas Air

Customer partnerships such as the EDS, Banc One Corporation & Norwest Corporation alliance are used to develop application offerings in areas where EDS lacks applications skills.

Software alliances, though small in number, have provided solid gains for EDS in the telecommunications market.

EDS has established a number of international alliances. In February 1987, it established a 50-50 joint venture with the Lucky-Goldstar Group, called System Technology Management (STM), to provide systems integration, data processing, and communications services to the Group's 20 affiliated firms and other Korean companies.

In September 1987, EDS Communications Corp. and Telefonica (Spain's national telephone, postal, and telecommunications organization) established a joint-venture company to develop, market, sell, and install packet data networks worldwide using Telefonica's packet-switching system.

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10. SI Capabilities Summary

EDS has a very strong set of capabilities and few weaknesses in the SI arena (See Exhibit EDS-10). It has outstanding information systems operating knowledge in the services industries based on its experience in running data processing installations for a great number of clients in the banking, financial, and insurance industries. It has similar experience with federal and state and local government customers.

EXHIBIT EDS-10

EDS' Competitive Status

Strengths	Weaknesses
Operational experience	Systems operations/ processing mentality
Vertical industry knowledge	Limited sales office network
Large experienced skill base	
Understands new technologies	
Alliances	

Based on more recent experience with General Motors, EDS has developed operating experience in virtually all areas of a large manufacturing company, from CIM applications to the consolidation and installation of a worldwide communications network.

These actual operating experiences make EDS uniquely qualified to develop and operate total information solutions. They also provide EDS with a very large and experienced skill base that can address a very broad range of industry applications.

EDS lacks hardware and software products (with the exception of its ownership position in Hitachi, USA), preferring to obtain other vendors' off-the-shelf products through its strong set of alliances. INPUT does not consider this a weakness because of EDS' strong financial resources and buying power.

EDS has a solid understanding of new technologies and integration techniques based on its experience in running 20 or more very large internal data centers and well over 100 customer premises data centers.

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INPUT does not believe that EDS has significant weaknesses. However, its traditional systems operation focus will most likely limit its competitiveness in some systems integration opportunities. Some prospects that are committed to running their own data processing operations will be reluctant to ignore EDS's traditional motivations when an SI solution is proposed. This is justified, since it appears to INPUT that in most cases systems operations is the underlying motivation for EDS's SI activities.

EDS does not have an extensive sales office network, which may prove to be a disadvantage, as it competes with hardware manufacturers that have near-site sales personnel.

11. SI Marketing Strategy

Exhibit EDS-11 identifies the key elements in EDS's marketing strategy. The company promotes itself as a systems management firm. It wants to provide total service—from developing an integrated solution, through systems integration, to total systems operations—for the customer.

EXHIBIT EDS-11

EDS SI Marketing Strategy

- Complete service provider
- Leverage GM experience and resources
- Broad market coverage
- Build on vertical industry experience
- Reference sell

INPUT believes EDS will leverage its GM-based buying power with hardware and software vendors and partners (e.g., Hitachi, U.S.A.), as well as the vertical-industry application knowledge it has developed at GM and while operating other installations in other industries.

Finally, a key element of EDS's strategy is to use references from successful systems integration and systems operations contracts to help sell to new clients. The company will use its own data center processing centers to demonstrate its capabilities and will use satisfied customers as references.

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In addition, EDS's new organization is focused on broadening its market coverage by establishing organizations responsible for solutions and growth in all vertical markets.

12. SI Customer Base

EDS has a broad range of systems operations customers. In many cases the first stage of these contracts requires EDS to develop a total integrated system solution. The majority of its revenue, however, comes from follow-on systems operations activities. The following table, Exhibit EDS-12, identifies representative customers where INPUT believes systems integration is an element of the total systems operation offering. Contract values are not provided, since INPUT believes that the systems operation content would make these values misleading.

EXHIBIT EDS-12

Examples Of EDS's Customers and Contracts

Company/Industry	Project Description
Champion Sparkplug	Computer-integrated manufacturing
Caterpillar Tractor	Plant automation
Enron Corporation	Companywide systems management
State of Massachusetts	Welfare eligibility
U.S. Army - Project 80X	Personnel management
U.S. Navy - Spar	Global retail inventory and supply system
State of Florida	On-line Human Services delivery system
Bank One	Integrated large commercial banking system

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13. Summary and Future Directions

EDS's broad range of operational experiences make it a very capable competitor in the SI arena. These strengths include:

- Vertical-industry knowledge of its traditional client base as well as GM-based discrete and process manufacturing, distribution, and aerospace experience
- Operational project development and technology transition management skills, based on actually running GM and EDS data centers and communications networks. This includes the capability to manage very large projects.
- A large, satisfied customer base
- Experience, financial resources, and product-buying leverage provided by its parent, General Motors. This insures its ability to bid very large projects at very competitive prices.
- A focus on total systems management that allows EDS to spread the initial systems integration risk over a longer time period and revenue stream

This last strength, a preoccupation with providing total systems management, may also turn out to be EDS' one major weakness. As a weakness it can:

- Lower EDS's priority on bidding on SI-only projects
- Preclude EDS from serious consideration by the SI customer that wants an integrated solution only, not a systems management contract

INPUT believes that EDS will move even more toward the total systems management concept, deriving its revenues not only from the front-end SI work, but also the follow-on systems operations contracts. The company will be extremely successful in systems management contracts, but less interested and less successful in standalone SI contracts.

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COMPANY PROFILE

Grumman Data Systems

1. Key Systems Integration Contact

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2. Description of Principal Business

Grumman Data Systems is an operating division of Grumman Corporation, which has provided systems integration services to the federal government for over 20 years. It has engaged in commercial SI projects for the past 10 years. Both groups report to management located at the Herndon, Virginia, facility, which in turn reports to the President of Grumman Corporation in Bethpage, NY.

GDS states that it has 2,000 full-time staff in its Federal SI sector and 500 full-time staff dedicated to its commercial business. While management indicates that GDS is an independent operating division, it does not indicate how many of these personnel might be located in Grumman Corporation's Bethpage facility, available for either GDS or corporate work. Other SI employees are located in facilities in Dayton, OH; Houston, TX; Huntsville, AL; San Diego, CA; Colorado Springs, CO; and Honolulu, HI.

The primary customers for Grumman have historically been the Department of Defense (DoD), the National Aeronautics and Space Administration (NASA) and other federal civil agencies. In the federal sector, the firm typically seeks contracts in the $100 million and over category.

While GDS has made some effort to penetrate the commercial sector over the past few years, it did not specify the amount of its revenue that comes from commercial projects. The firm's management has indicated that its typical commercial contract averages between $300,000 and $1 million.

Grumman Corporation, like all defense contractors, announced significant personnel cutbacks in 1992. Anticipating that these cutbacks would be of a long-term nature, it announced that it would merge its aircraft group with its space and electronics group to create an aerospace and electronics group.

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Yet Grumman did reasonably well in 1992, despite cutbacks in its aircraft and electronics business and losses in its reinsurance division. The firm ended 1992 with a production backlog and is expected to hold its own over the coming year.

Grumman Data Systems, owing to its roots in defense technology, offers an impressive array of capabilities in the high-end systems integration market. It offers expertise in high-speed information processing systems, distributed processing, text processing, custom software engineering, multi-level security operations, processor architecture, artificial intelligence, fault-tolerant processing, robotics, communications, and graphics. The firm is a full-service provider of logistics services, training, and systems maintenance and enjoys an excellent reputation among its customers.

Though it declines to name companies with which it has either long-term or short-term alliances, GDS acknowledges that it has both. It has clearly formed a long-term alliance with super computer manufacturer Cray Research, Inc.

Grumman announced its receipt of a NASA award in the fourth quarter of 1992. Valued at $300 million, it may impact the resources that Grumman could apply to major commercial accounts in the immediate future.

3. Competitive Position

Grumman Data Systems is a formidable player in the high-end federal systems integration market, particularly when competing for a Department of Defense or NASA contract, where its track record is excellent. Though the company declines to state the percent of its current business that originates from its current customer base, INPUT estimates that the figure is extremely high.

GDS generated revenues in 1991 of $230 million. It estimated that its 1992 revenues would be about the same, $240 million. Given the new NASA contract for $300 million, as well as other pending contracts, GDS should easily exceed these revenue figures in 1993 and 1994. Though GDS declined to specify profitability, they described both commercial and federal sector profitability as stable.

As illustrated in Exhibit GDS-1, in the federal sector, GDS sees Boeing Computer Services, EDS, CSC, IBM, and PRC as competitors. CDC was its primary competitor in the recently won $300 million NASA contract.

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EXHIBIT GDS-1

Grumman Data Systems

Competitors

Commercial	Federal
IBM	Boeing Computer Services
CSC	EDS
EDS	CSC
Lockheed	IBM
Data General	PRC

In the commercial sector, the company views IBM, CDC, EDS, Lockheed, and Data General as its primary competitors. But it is questionable whether any of those mentioned, with the exception of Lockheed or perhaps Data General, would be especially concerned about Grumman in the commercial sector for any but a limited number of specialized projects.

Grumman Data Systems is no doubt interested in the commercial sector, especially given the market projections for the next five years. However, given the continuing availability of DoD and NASA contracts, it is questionable whether GDS will have the resources (or secure the assistance that might be necessary from Grumman Corporation) to shift emphasis to the commercial marketplace.

4. Markets Served

As illustrated in Exhibit GDS-2, given its extensive technical background and large project management experience, Grumman Data Systems can make a strong case for itself as a potentially broad-based systems integrator. In fact, the company indicates that it has in progress, or has completed, 20 federal and 20 commercial projects, since 1990. Though the company declined to provide project revenues from either federal or commercial projects, or a breakout of the percentage that SI accounted for in those revenues, it is clear that commercial projects have yet to account for a significant part of GDS business.

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EXHIBIT GDS-2

Grumman Data Systems

Market Summary
Based on Technical Capabilities

Vertical Markets	Horizontal Markets
Defense	High-speed information
Aerospace	Robotics
	Text processing
	Graphics
	Distributed processing/communications

The problem faced by Grumman Data Systems in any bid for commercial business is clearly reflected in its very strengths. Its specific, vertical market expertise is clearly evident in the company's roots, the defense and aerospace sectors.

The expertise gained in those sectors has limited application in the commercial sector. Furthermore, GDS is just beginning to build the full-service capability that the commercial sector is increasingly demanding.

For example, the firm's high-speed information processing expertise, particularly in light of its preference for very large projects, has a very limited number of potential projects in the commercial sector. Commercial firms are looking for smaller, modular projects, with faster completion and, hence, faster ROI (return on investment). Also, such projects frequently involve a significant management or business consulting element which, as will be discussed later in this analysis, is currently lacking in the GDS organization.

An expertise in robotics would place them in the manufacturing sector, with a projected high growth rate in the SI marketplace. Here, however, they will come up against companies like Andersen Consulting or Digital Equipment, which have a strong vertical market track record and expertise. The fact that GDS does not even list these companies as competitors suggests that it is not bidding in this sector.

The graphics and text processing markets are extremely competitive. Furthermore, project size has been limited, as businesses have shown some reluctance to invest in this technology on a large scale. This may, however, be an area where GDS could look to the Federal civil market.

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Project descriptions provided by Grumman Data Systems reflect the strengths described in this analysis:

- U.S. Air Force Materiel Command: Manage the development and installation of an on-line management information and operations system for aircraft maintenance, maintenance materials and supplies, and related support equipment

- NASA: Design, integrate and install a super computer based system to support manned space flight programs—space shuttle, space station, and advanced space exploration studies

- Suffolk County (New York State): As subcontractor, provide the systems integration capability required to automate the processing and records management of the criminal justice system

- South Carolina Research Authority: Member of team developing a system that incorporates COTS software to create modular, adaptable manufacturing environment that allows both DoD and commercial manufacturers to reduce the time needed to create parts

- Korean National Police: Modernize the command, control, and communication system of the metropolitan police, as well as oversee the development of a master plan to expand the system into the rest of the country.

5. Recent Events of Interest

- Grumman is part of a team awarded a $300 million NASA contract to integrate non-mission computer operations at the Johnson Space Center in Houston.

- A joint venture between Cray Research, Inc. and Grumman was selected to enter final negotiations on a contract which would provide high-performance equipment and services to NASA's George C. Marshall Flight Center in Huntsville, Alabama, and have a total value of about $129 million.

6. SI Organization

As previously referenced, Grumman Data Systems indicates it is an independent division of Grumman Corporation. It seems more likely, however, that it should be more properly described as a matrixed organization, with personnel resources provided by the Grumman organization as required.

The allocation of GDS staff, illustrated in Exhibit GDS-3, is fairly typical of SI vendors in general, with the possible exception of a 10% staff allocation to legal/contract administration. This is approximately twice the staff allocation of the typical SI vendor, but is not surprising for a vendor concentrating on the management of very large federal projects.

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EXHIBIT GDS-3

Grumman Data Systems

Staff Allocation

Function	Allocation (Percent)
Management, strategy, and planning	5
Legal support/contract administration	10
Project management	5
Systems development/implementation, hardware/software evaluation/acquisition, and hardware engineering	70
Sales	10

The GDS approach to SI responsibility distribution (Exhibit GDS-4) is consistent with SI vendor trends in the management of federal projects, but its commercial sector organization reflects much less decentralization than is typical of an SI vendor.

EXHIBIT GDS-4

Grumman Data Systems

Centralization/Decentralization of SI Business Functions

Function	Commercial	Federal
Strategy/long range planning	C	C
Marketing and promotion	C	C
Account management/sales	B	C
Contract review/approval	C	C
Project management/control	B	D
Implementation/development	B	D
Hardware/software acquisition	C	B
Systems operations	B	D

C=Centralized; D=Decentralized; B=Both.

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Account management and sales, project management, implementation and development, and systems operations are increasingly decentralized functions in most SI vendor operations. Vendors have found that a centralized function in these areas simply cannot respond quickly enough, or cost effectively enough, to client requirements. The GDS variance from this trend can be interpreted as reflecting its slow movement toward the commercial sector.

7. SI Business Objectives

Grumman Data Systems treats SI as a profit center. Management indicates that responding to customer demand is a primary motivation in SI service. They also see follow-on facilities management contracts as a primary business objective.

Surprisingly, management failed to list "account base control" as either a primary or secondary objective, which is inconsistent with a primary objective of front-end systems integration through follow-on facilities management. The response is also inconsistent, given the apparent high degree of business penetration GDS enjoys from select accounts.

Though GDS lists hardware and software sales as a highly profitable part of its business, follow-on sales in this segment was described as a secondary objective. Also described as being of secondary importance was the strengthening of the firm's non-SI business.

8. SI Capabilities Evaluation

As illustrated in Exhibit GDS-5, the GDS emphasis on capabilities is consistent with a high-end, technically oriented vendor. Design methodology, design/integration, project management, and software development are all highly valued and available internally. Network management/operations, service and repair, and software maintenance are also highly valued and internally available. This is consistent with the GDS primary SI marketing objective of follow-on facilities maintenance contracts.

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EXHIBIT GDS-5

Grumman Data Systems

Self-Assessed Capabilities

Capability	Exists	Value*	Alliance
Business Consulting	Y	M	Y
Design Methodology	Y	H	
Design/Integration	Y	H	
Project Management	Y	H	
Software Development	Y	H	
Education/Training/Documentation	Y	H	Y
Packaged Applications Software	N	L	Y
Standard Computer Hardware	N	L	Y
Custom Computer Hardware	N	L	Y
Communications Hardware	N	L	Y
Network Management/Operations	Y	H	
Service and Repair	Y	H	
Software Maintenance	Y	H	Y

*H=High; M=Medium; L=Low.

Business consulting is rated at medium value by GDS management and, though available internally, is also supplemented by outside alliances. The medium importance rating is a lowered estimate from the firm's 1990 rating, when it indicated that it would be pursuing commercial business more aggressively. It is also inconsistent with the perceived value of business consulting in the commercial sector.

9. SI Strategic Alliances

Grumman Data Systems indicates that it has a formal alliance program, managing both short-term and long-term relationships. The firm declines to specify companies with which it has formed alliances, or the specific purpose of those alliances, beyond a general statement of designing "...the best systems integration solution."

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Exhibit GDS-5 indicates the areas in which the firm has established alliances. Lower-profit items like packaged application and systems software are handled through a series of alliances, as are computer and communications hardware. Labor-intensive items like education, documentation, training, and software maintenance are highly valued resources, both available internally and supplemented with outside alliances.

Clearly, GDS has established a formal, long-term alliance with Cray Research, Inc. Jointly with Cray, GDS recently was awarded the previously referenced $300 million NASA contract.

GDS management is clearly concerned that alliances may contaminate the firm's image. As they indicated in the survey, "...alliances, while important, can't alter our vendor-independent posture with prospective clients."

Hence, it is probably a good assumption that those areas in which the firm has no alliances are the ones it considers most important to its marketing, as well as its overall performance. The categories are consistent with a high-end technical service firm servicing government accounts.

10. SI Marketing Strategy

The marketing approach emphasized by Grumman Data Systems (see Exhibit GDS-6) includes an emphasis on a high level of technical excellence, experience, and resources, e.g., systems integration skills and the ability to execute well-conceived Live Test Demonstrations (LTD's). Commitment to the principles of total quality and customer satisfaction is stressed, as is a focused opportunity identification and selection process, including the development of the right solution at the right price. The firm emphasizes an in-depth understanding of the customer and its mission and modus operandi.

EXHIBIT GDS-6

Grumman Data Systems

Marketing Strategy

- High-level technical excellence
- Well-received Live Test Demonstrations (LTD's)
- Commitment to total quality/customer satisfaction
- Development of the right solution at the right price
- Support from the Grumman Corporation
- In-depth understanding of the customer
- Management expertise: complex systems integration contracts

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Support from the Grumman Corporation assures a prospect of financial stability and the resources to take full project responsibility. The assurance of management expertise gained through experience on complex system integration contracts is also convincing.

Separating the generalities from demonstrable specifics, GDS is clearly selling itself as a high-end systems integrator, offering extensive technical depth, an excellent large project management track record, and the stability gained through Grumman Corporation and necessary to assure prospects that it can reliably assume financial responsibility.

Surprisingly enough, given such a conventional and predictable marketing approach, GDS appears more committed to active promotion than one might otherwise predict. As illustrated in Exhibit GDS-7, GDS appears to be reasonably committed to an aggressive advertising program.

EXHIBIT GDS-7

Grumman Data Systems

Methods of Promotion

Method	Use (Y/N)	H/M/L*
Public Seminars	Y	H
Direct Mail	Y	M
Advertising (General Business Pubs)	Y	M
Advertising (Trade or Industry Pubs)	Y	H
Advertising (Television)	N	–
Word of Mouth/Client Referrals	Y	H
Other: Trade Shows	Y	H

*H=High activity/value; M=Medium activity/value; L=Low activity/value

As is typical of SI vendors, word of mouth and public seminar appearances rank high on the promotion list. But advertising in both general business and trade publications is also on the GDS schedule, as is active trade show participation.

Direct mail is also used, although to a lesser degree. This is not surprising, as this method presupposes a highly targeted and identifiable prospect audience, which is atypical for the SI industry, especially in the commercial sector where user/buyers may be distributed throughout target organizations.

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11. Summary

Grumman Data Systems is a highly competent, top-end vendor, specializing in highly complex information processing projects, primarily for a select group of federal government clientele. The firm performs well and tends to maintain account control in this context.

While its avowed interest in the commercial sector is no doubt sincere, INPUT finds it unlikely that it will make serious inroads into this sector for any but highly specialized contracts in the short term.

Business consulting is a "front end" function which is frequently key to securing major commercial SI contracts. Leading commercial sector firms like Arthur Andersen view this function as critical to securing and successfully managing SI commercial projects. The fact that GDS rates this function below technical and project management functions does not bode well for its short-term chances for a significant commercial sector position.

Its recent NASA award will also keep the firm relatively busy and focused on the federal sector. Unless GDS is prepared to create a dedicated commercial sector group, it is unlikely that it will be able to expend the effort necessary to gain significant share in the commercial sector.

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COMPANY PROFILE

GTE

1. Key Contacts

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Mr. John Messier
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(813) 978-6009

2. Description of Principal Business

GTE is the fourth-largest publicly owned telecommunications company in the world, with revenues and sales of $19.6 billion. The corporation is the largest U.S.-based local telephone company and the second-largest cellular service provider in the United States. GTE is also a leader in government and defense communications systems and equipment, satellite and air-to-ground telecommunications, directories and telecommunications-based information services and systems.

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GTE Government Systems Corporation (GSC), headquartered in Waltham, Massachusetts, is a pioneer in the advancement of Command, Control, Communications and Intelligence (C^3I) technology, and a major supplier of customized systems for defense, government and industry in the U.S. and abroad. The corporation's C^3I experience and accomplishments span close to half a century.

From its early work in radar and countermeasures in the 1950s to today's advanced communications and imagery systems, Government Systems has been on the leading edge of technology. An innovator in such areas as artificial intelligence, fiber optics and microelectronics, the corporation is also making significant contributions to digital switching, signal processing, secure voice, data communications and satellite-to-underwater communications.

GTE Corporation's merger with Contel strengthened Government Systems' technical and marketing capabilities. The merger has enlarged GSC's customer community and brings complementary skills not available before.

The integration also enhances GSC's international presence and expands its range of field services.

Now, Government Systems, with its more than 11,000 employees, is equipped to respond rapidly and effectively to a variety of business opportunities in a changing world marketplace. This includes pursuit of new customers in civil agencies and major corporations seeking telecommunications systems and management of major system developments.

GSC operates research and manufacturing units in California, Colorado, Massachusetts, North Carolina, the Washington, DC area and Rome, Italy.

The capabilities of GSC encompass a broad spectrum of technologies in addition to C^3I systems. These include military switches, advanced signal processors, collection and processing systems, sensor systems, training simulators, laser and optical fiber devices and radio transceivers.

Among its services are system design, program management, operation, maintenance, education and training.

The Command, Control and Communications (C^3) Systems Sector, headquartered in Needham, Massachusetts, is a leader in the design, development and production of tactical and strategic state-of-the-art C^3 systems for governments, military forces and commercial organizations worldwide.

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The sector employs approximately 5,500 men and women of whom 1,600 are engineers and scientists, many with advanced degrees.

C^3 Systems Sector has wide-ranging capabilities—systems engineering and architecture, software-intensive systems design, utilization of artificial intelligence, and the total integration of information systems, hardware design, manufacturing, installation, training, logistics support, operation and maintenance.

The Federal Systems Division (FSD), formerly a part of Contel, provides and manages integrated systems solutions tailored for information processing and communications needs. More than 1,500 employees working at three major locations bring together telecommunications and data processing skills to help government and commercial customers more effectively manage vast quantities of information.

Like other divisions within GSC, the largest FSD customer is the Department of Defense. DoD relies upon AUTODIN, a secure digital message switching system network operated by FSD. It links U.S. Armed Forces installations around the globe. Designed, developed and implemented by GTE, AUTODIN is the only multilevel secure message switching system in existence. It has been in continuous operation since 1963 and handles more than 40 million messages monthly with network performance and reliability exceeding 99 percent.

GTE engineers at Federal Systems are also applying communications, networking and systems integration capabilities to create a new generation of information resource management systems that combine new and existing office equipment and technologies. These systems significantly improve productivity, enhance management control and provide easy access to time-sensitive data.

One such system is installed at the Pentagon in the Office of the Secretary of Defense. Called the Office Automation Secure Information System (OASIS), it is a secure network that links multiple types of hardware to support a full spectrum of user requirements, from basic word processing to highly technical development operations. The system operates on a high-speed fiber backbone and features document storage and retrieval using optical disk technology.

Software development is an integral part of the support provided by the division. At its Information Systems Modernization Center in Montgomery, Alabama, FSD engineers are updating software under a U.S. Air Force Command and Control System (AFC2S) software modernization contract. The modernized AFC2S will provide Air Force commanders throughout the world with up-to-date information on operations, logistics, manpower and other crucial areas.

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FSD also affords GTE Government Systems an extensive client base of civilian government agencies, including the Department of Commerce, Federal Aviation Administration (FAA), U.S. Treasury Department, Justice Department, and National Aeronautics and Space Administration (NASA).

GTE Telecommunications Services Organization (TSO) was formerly part of Contel. TSO employees provide various services, from the operation of ground terminals in support of space missions to the engineering, installation, operation and maintenance of classified voice and data communications networks.

TSO employees operate NASA's space-based communications system, the Tracking and Data Relay Satellite System (TDRSS), from a ground station in White Sands, New Mexico. GTE engineers and technicians maintain virtually continuous communications between earth and numerous satellites, including the Hubble space telescope, through TDRSS. The system is NASA's primary link to low earth-orbiting satellites and is considered a national asset by the government.

The National Oceanic and Atmospheric Agency of the Department of Commerce relies upon FSD for the collection and distribution of the nation's public weather information. This includes the dissemination of National Weather Service weather watches and warnings to commercial media outlets.

Commercial, military and general aviation also depend upon a GTE system for weather information. Through a contract with the FAA, aviation weather and flight plan filing is handled by FSD at 20 Air Route Traffic Base Operations. Another FSD program with the FAA uses fault-tolerant microprocessors to catalog and format weather information for display on demand by commercial aircraft in flight.

The U.S. Customs Service of the Treasury Department employs a command, control, communications and intelligence (C^3I) system developed by the division for the war on drugs. From systems located in Florida, California and Oklahoma, customs agents are able to fuse radar data, flight plans, communications, intelligence and operations support from a wide variety of sources to support international, national and local law enforcement drug interdiction efforts.

FSD is installing telephones and inmate call management systems at more than 100 federal prisons for the U.S. Justice Department Bureau of Prisons. The systems allow inmates to place direct-dial local and long-distance calls to a pre-approved list of parties and to pay for this service out of personal funds. Incarcerated individuals are able to maintain family links, so vital to rehabilitation, but with complete prison administrative control that does not compromise security.

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Several agencies, including NASA, Department of Energy and DoD, lease a network of satellite earth stations that are owned by FSD. More than 150 locations are provided with full digital communications services through the system.

GTE continues to pursue large federal integration opportunities like the Army's $1 billion Sustaining Base Information Services (SBIS) and the FBI's National Crime Information Center (NCIC 2000) upgrade.

GTE Government Systems Corporation's organization is shown in Exhibit GTE-1. GTE Vantage Solutions installations are shown in Exhibit GTE-2. The organization of GTE's Federal Systems Division is shown in Exhibit GTE-3.

GTE Vantage Solutions (GTE VS) is part of GTE Vantage, Inc., a venture capital organization in GTE Telephone Operations. It is attacking the commercial marketplace by establishing alliances with over 35 technology partners. GTE VS is providing an electronic framework for object-oriented approaches involving imaging, multimedia, workflow management, and communications. Its goal is to create a pool of core imaging technologies from which the company can assemble solutions. This is one part of GTE's new Vantage Solutions program. The other part involves recruiting regional high-end distributors and value-added resellers to become sales and support agents for the Vantage Solutions program. GTE VS is targeting opportunities in the banking, insurance, legal, and utility sectors. Secondary markets include state and local governments, manufacturing and health care.

GTE VS views itself as a cross between a value-added reseller and a venture capitalist, rather than either a vendor or an integrator. It wants to be viewed as a true solutions provider.

3. Company Competitive Position

GTE is a worldwide leader in telecommunications, with combined revenues and sales in 1991 of $19.6 billion and net income of $1.6 billion. It is the largest U.S.-based local telephone company, and the second largest cellular service provider in the United States.

GTE employs 195,000 men and women worldwide. Its subsidiaries operate in 48 states and 41 countries.

GTE Government Systems is a unit of GTE Telecommunications Products and Services. Other parts of that organization are GTE Mobile Communications, GTE Information Services, GTE Spacenet and GTE Airfone.

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EXHIBIT GTE-1

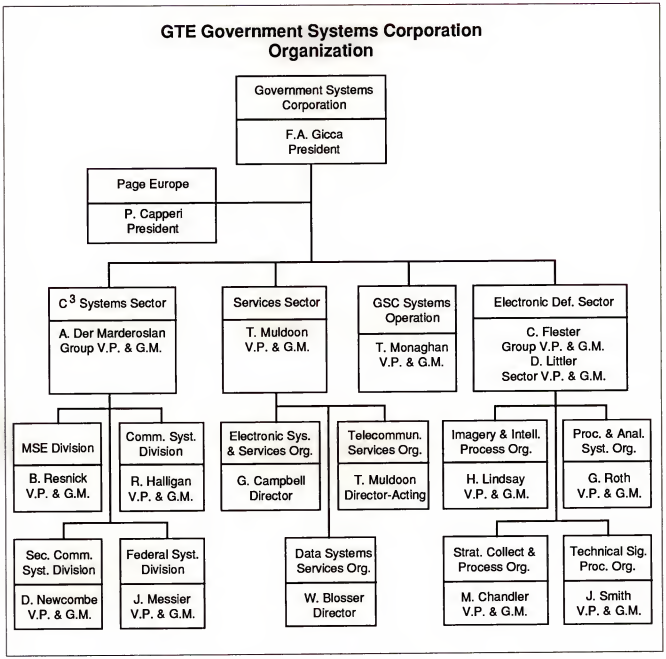

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EXHIBIT GTE-2

GTE Vantage Solutions Installations

- Barnett Banks
- Indianapolis Power and Light
- Internal Revenue Service
- Mason and Hanger
- Massachusetts Bay Transit Authority
- Proficiency Testing Service
- Whitby Pharmaceutical

GTE Government Systems Corporation (GSC), headquartered in Waltham, Massachusetts, is a pioneer in the advancement of Command, Control, Communications and Intelligence (C^3I) technology, and a major supplier of customized systems for defense, government and industry in the U.S. and abroad. The corporation's C^3I experience and accomplishments span close to half a century.

GTE Corporation's merger with Contel strengthened Government Systems' technical and marketing capabilities. The merger has broadened GSC's customer community and brings complementary skills not available before. The merger created GTE Federal Systems from what was formerly Contel Federal Systems.

Now FSD, with its more than 1,500 employees, is better equipped to respond rapidly and effectively to a variety of business opportunities in a changing world marketplace. This includes pursuit of new customers in civil agencies and major corporations seeking telecommunications systems and management of major system developments.

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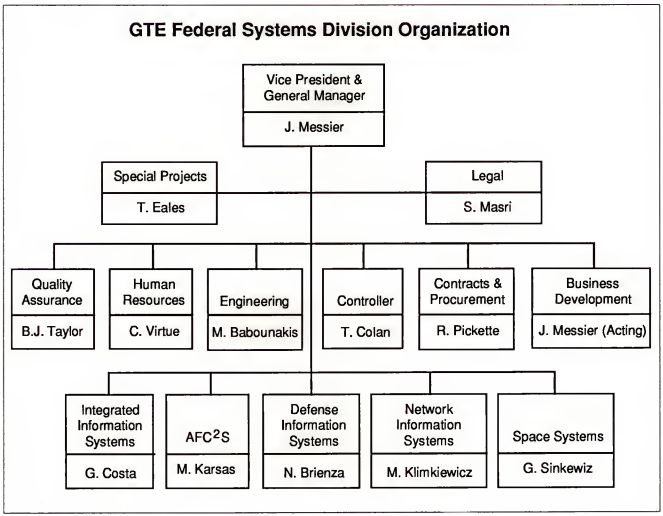
EXHIBIT GTE-3



As part of the C^3 Systems Sector, FSD has access to a complete spectrum of capabilities—systems engineering and architecture, software-intensive systems design, utilization of artificial intelligence, and the total integration of information systems, hardware design, manufacturing, installation, training, logistics support, operation and maintenance.

FSD is in a very competitive position for future business in the Navy umbrella communication program called "Sonata" (formerly Copernicus) and the Army program SBIS, which will start as an Army program and is expected to grow into a DoD-wide contract for services and hardware.

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GTE VS is in an extremely competitive market. Being new and small may actually work to its advantage because most companies who want document management systems prefer starting out small, in just one department. Since GTE has targeted many small technology companies to be image technology partners, it is difficult to forecast just who will become partners and who will remain competitors. With each new PC or workstation chip-set improvement, image and multimedia applications become more cost effective and new solution vendors appear.

4. Markets Served

It has been estimated that 65% of GTE's systems integration revenue comes from the federal government. Exhibit GTE-4 shows the markets in which GTE specializes.

EXHIBIT GTE-4

GTE Markets

GTE VS	GTE FSD
Banking	Federal government
Insurance	Telecommunications
Utilities	

5. Recent Events of Interest

GTE was awarded a $70 million contract to develop systems to provide weather information for USAF and a $70 million project to develop a data communications system to link 400 U.S. Air Force medical facilities.

GTE was awarded the Joint Staff Automation for the Nineties (JSAN) program, which is a $12 million per annum program designed to increase mission effectiveness of the Joint Staff through a user friendly, integrated suite of hardware and software. The program is to run for eight years.

The program will gradually integrate the existing computers and associated peripherals of JIMS (Joint Staff Information Management System) with the new JSAN system, providing an orderly transition between the existing system and the JSAN system.

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JSAN provides high-performance user workstations, integrated office automation software, and secure networking to serve a full spectrum of user requirements—from basic word processing capability to very sophisticated modeling and analysis.

JSAN is based on an open systems architecture. JSAN users can communicate among themselves, to JIMS users, and to other systems transparently. This architecture, along with salable hardware, allows users to move from a basic workstation to a high-speed processor, always working with exactly the same user interface. JSAN was awarded in November 1991 and protested by Grumman. GTE cannot proceed until this protest is resolved.

GTE has divested itself of Telos Corp. of Santa Monica, CA by selling it to C3, Herndon, VA.

GTE VS has won a $100 million, five-year program at Barnett Bank, a $200,000 program from the IRS, and a $350,000 contract from the Defense Nuclear Review Board.

At the 1992 Association for Information and Image Management (AIIM) Annual Show, GTE VS introduced tools for the image processing market that can convert a variety of multimedia information, including full motion video, into a single data format. This will make the data available for simultaneous access.

6. SI Organization

GTE uses both independent divisions and matrixed organizations for its SI operations.

GTE Corporation has established two organizations in Northern Virginia to pursue systems integration business. GTE Federal Systems Division was formed by GTE when GTE Government Systems consolidated with Contel into GTE Government Systems Corporation. This activity continues to target federal, state, and local systems integration opportunities.

GTE Vantage Solutions started as Contel Commercial Systems. Its name was changed to GTE Vantage Solutions as GTE exercised its control over Contel. It was created to target commercial systems integration opportunities in banking, insurance, and utilities.

Like other federal integrators, FSD still has the federal mindset and corporate culture that will hamper efforts to get into the purely commercial world.

The way that FSD assigns responsibilities is shown in Exhibit GTE-5.

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EXHIBIT GTE-5

Responsibilities

Task	Matrix
Responsibilities/long-range planning	D
Marketing and promotion	D
Account management/sales	D
Contract review/approval	D
Project management/control	D
Implementation/development	B
Hardware/software acquisition	D
Systems operations	B

D = Decentralized, C = Centralized, B = Both

7. SI Business Objectives

As mentioned elsewhere, GTE continues to pursue huge federal systems integration contracts. Winning the $1 billion SBIS opportunity has been a major undertaking because of the size of the contract, the need for teaming partners, and the investment needed to stay in the game. Most other major federal system integrators have targeted this opportunity. The GTE team is up against teams led by IBM, EDS, and TRW.

EDS was the prime contractor for the VIABLE program, which spawned the SBIS program. EDS should be considered the incumbent, even though the Army has been running the VIABLE computer centers.

GTE Vantage Solutions' objectives are to develop alliances with specialized product and services vendors. This will allow GTE to assemble imaging, multimedia, workflow, and communication solutions out of the partnership products. The validity of this market approach for GTE Vantage Solutions has yet to be proven.

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8. SI Capabilities Evaluation

GTE, with over $1.6 billion in net income, has the talent and experience to address any significant SI job, especially those involving networking.

FSD must also work on developing the ability to move from its current mainframe architecture used in 58% of its SI jobs to a distributed architecture. The mainframe percentage is high because it includes data from GTE Data Services. FSD will use specialized tools in case/design methodology and GTE VS will use multimedia solutions to win new business.

9. Strategic Alliances

Like most federal SI vendors, GTE tends to form ad hoc alliances with companies that could be its competitors the following week. This is common practice in federal systems integration, but comes as quite a shock to commercial business people. Alliances depend on what it will take to win the deal and much depends on the integrators' sense of which hardware, software solutions, and companies the customer wants to see on the SI team. Thus, FSD develops alliances but is not bound by them.

FSD will develop alliances to add capabilities in packaged applications software, packaged systems software, and standard computer hardware where the capabilities don't exist. Alliances in software development, custom computer hardware, communications hardware and software maintenance will augment existing capabilities. A long-term agreement exists with Hewlett-Packard to provide computer hardware.

In contrast to the *ad hoc* tendencies of federal SI activities, GTE VS is establishing technology partners for its commercial imaging work. Current partners include: AEG, Amtech, BTG Products, Calera Recognition, Cirrus Technology, GeneSys Data, I-Pro, Infinite Images, JRM, KLT Telecom, Mekel Engineering, Meridian, Micro Dynamics, Personal Library Software, and Analytic Sciences.

10. SI Capabilities Summary

As part of the merger in 1991, Contel's Federal Systems organization was integrated into GTE Government Systems. One major segment became an operating division within the Command, Control and Communications Systems Sector. This division combined separate information management initiatives of GTE and Contel into one cohesive organization, the Federal Systems Division.

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During 1991, GTE Government Systems received orders valued at $1.2 billion, reflecting continuing opportunities in the communications portion of the defense market. GTE Government Systems ended the year with a backlog of $2.2 billion, which includes several large orders for communications equipment under the Mobile Subscriber Equipment (MSE) contract. GTE Government Systems has been developing and producing MSE systems that enable Army personnel to communicate to and from almost anywhere in the world, under an eight-year contract awarded in 1985.

GTE Government Systems, like other members of the industry, predicts a continued decline in the Department of Defense budget for the foreseeable future based upon the recent events in the former Soviet Union and Eastern Bloc. The diminished threat to the U.S. resulting from these events, as well as the increased emphasis on domestic problems and programs will, however, provide opportunities within the civilian market, especially in the areas of communications and information processing.

Consequently, GTE has broadened its marketing strategy to seek not only a stronger presence among traditional military customers, but also to serve non-defense customers such as the Federal Aviation Administration and the Treasury Department. GTE's augmented capabilities also position it to compete vigorously for new business from the Federal Bureau of Investigation, the Internal Revenue Service and other government agencies.

Results of GTE Government Systems plans depend to a large extent on its ability to compete successfully for contracts with governmental agencies, primarily the Department of Defense. This unit faces intense and increasing competition in the U.S. for what is expected to be a shrinking U.S. defense budget. Principal U.S. competitors include: Loral, ITT, Boeing, CSC, Martin Marietta, Rockwell, TRW, Harris, E-Systems, Lockheed/Sanders, and GE/RCA. Principal foreign competitors include Thomson-CSF, Ericsson and Siemens.

In summary, GTE will continue to pursue contracts like SBIS as the prime contractor. It will also work with other federal integrators, as it did with Boeing on the RCAS project, as a subcontractor. It will look to lower cost providers for labor-intensive activities while retaining the more sophisticated work for itself.

GTE will attempt to leverage its Defense Department success into successes in the civilian federal, state, and local markets. However, INPUT expects that, like other federal SI vendors, GTE will need to maintain its installed base in the DoD because it is too difficult, in the near term, to develop customers in the commercial SI market.

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GTE VS will need to leverage its existing alliances to pay back current investments. It may find that its existing solutions will not lend themselves to a modular solution, and so will be required to spend excessive time working with modifications of the original code rather than developing new opportunities.

11. SI Marketing Strategy

GTE GSC feels that with its background in C^3I technology and as a major supplier of customized systems for defense, government, and industry, it is ready to apply its employees in rapid and effective response to business opportunities in civil agencies and major corporations seeking telecommunications systems and the management of major system developments.

FSD develops most of its federal business from existing clients. At the same time, it finds its margins for federal business declining. FSD is the prime contractor on most of its projects.

FSD uses shows like those of AFCA because they give the best return on FSD's promotional dollar. FSD has found that word of mouth/client referrals can be nearly as successful as trade shows. Direct mail and trade advertising have been less successful.

INPUT feels that GTE FSD, like other DoD systems integrators, will need to drop much of its "Cold War" DoD culture to compete effectively in the commercial market.

In its 1991 Annual Report, GTE claims that the GTE/Contel merger created the largest U.S.-based local telephone company. GTE may be spending more time with the telephone part of the merger and less time developing a coherent strategy for the systems integration part of the GTE/Contel merger.

Over the next few years, INPUT expects GTE FSD to both compete with and team with the other major federal system integrators.

Competitors are shown in Exhibit GTE-6.

GTE VS will target opportunities in document management in industries with the biggest problems: aerospace, pharmaceuticals, chemicals, insurance, financial services, legal, and government agencies. GTE VS feels that the federal market will be critical for multimedia products.

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EXHIBIT GTE-6

Competitors

Commercial	Federal
Kodak	TRW
AT&T	Boeing
FileNet	DEC
Microtrac	IBM
CBIS	AT&T
	CSC
	Hughes ITC

12. SI Customer Base

GTE GSC representative customer and projects are presented in Exhibit GTE-7.

13. Summary and Future Directions

INPUT expects GTE to continue to pursue massive federal integration efforts. INPUT expects to see the expertise developed for DoD SI projects being applied to federal civilian SI projects rather than to commercial projects.

If GTE Vantage Solutions, Inc. is a test case for commercial systems integration, GTE may have selected an overly competitive area in which to initiate its new approach to being a systems integrator.

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EXHIBIT GTE-7

GTE Government Systems SI Project Examples

Company/ Organization	Project
DoD	AUTODIN
SECDEF	OASIS
USAF	AFC^2S
NOAA	Weather information
FAA	Air route traffic Weather information
U.S. Customs	C^3I
Bureau of Prisons	Inmate call management system
NASA	TDRSS

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COMPANY PROFILE

Hughes Aircraft Company

1. Key SI Contacts

Mr. C. Michael Armstrong
Chairman & CEO
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(310) 568-7200

Hughes Space and Communications Group
P.O. Box 92919
Los Angeles, CA 90009

Mr. Joe Kennedy
President and CEO
Hughes LAN Systems
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Mountain View, CA 94043
(415) 966-7300

Mr. Wayne Shelton, President and CEO
Hughes Information Technology Company
1768 Business Center Drive
Reston, VA 22090
(703) 759-1730

Dr. Ashok Kaveeshwar, President
Hughes STX Corporation
4400 Forbes Blvd.
Lanham, MD 20706-4392
(301) 794-5000

2. Description of Principal Business

Hughes Aircraft Company (HAC), a subsidiary of GM Hughes Electronics, is one of the nation's largest suppliers of military and related commercial electronics, with 1991 sales of $7.71 billion. Although its name reflects the fact that it once made aircraft, the company today is a broadly diversified industrial complex. Its many thousands of products and services encompass electronic systems, equipment, components and field services for airborne, space, ground-based, shipboard and undersea applications. Included are radio frequency, microwave, acoustic, electro-optical, fiber optic and multiplex wire communications equipment and systems; satellite communications and applications systems; military and

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civil command, control and information distribution systems; computers, signal processors, data displays, control consoles, simulators and large-scale software systems; radar, sonar, infrared, television and laser sensors, reconnaissance/surveillance and electronic warfare equipment and systems; guided missiles, torpedoes and associated weapon control systems; simulation systems; and specialized components such as monolithic and hybrid microcircuits and solid-state microwave and millimeter wave components.

Like other defense contractors, HAC is looking for ways to diversify into the federal civil market and then into the commercial market. In May 1992, HAC demonstrated its technologies for a nationwide Intelligent Vehicle Highway System to IVHS America, the organization overseeing the development. Lockheed and AT&T had already announced their development partnerships.

It may be the massive federal, state, and local projects like IVHS America that best use the expertise of the defense systems integrators.

Hughes Information Technology Company (HITC) was formed as a subsidiary of Hughes Aircraft Company (HAC) to build on 30 years of federal SI and five years of commercial SI experience. HITC has entered the SI market because of its ability to manage risk and capacity, technology expertise, depth, and client relationships and, to a lesser extent, project management skills. Mr. Wayne Shelton was brought in from another well-known system integrator as President and CEO.

The mission of HITC is summarized in Exhibit HAC-1.

Early in 1992, HAC acquired ST Systems Corporation (STX) of Lanham, MD, made it a subsidiary, and renamed it Hughes STX Corporation (HSTX). This added professionals with experience in civilian and commercial earth and space science programs, transportation systems, and information management to HITC's experience with DoD and other classified programs.

HITC and HSTX now have more than 3,000 professionals to apply to SI programs. The HITC organization components are listed in Exhibit HAC-2. Most of HITC's current military and intelligence programs are classified. They cannot be discussed or even enumerated in an unclassified document such as this profile. HSTX has worked for civilian federal and commercial organizations. Information about this work is more readily accessible.

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EXHIBIT HAC-1

Summary of HITC Mission

- Preserve and increase Hughes' strengths in technology
- Broaden information system base
- Develop new clients in:
  - Intelligence Data Management System
  - Space Craft Command and Control Systems
  - Ground Station System
  - Federal Information Systems
  - Defense C^3I Systems
  - Earth and Space Science
  - Geographic Information Systems

HITC hopes to leverage its existing contracts in network and data base integration within DoD and its air traffic control work to expand into new markets.

In 1989, HAC acquired SYTEK, a leading local-area networking company, and renamed it Hughes LAN Systems (HLS). HLS has more than 12 years of experience in designing, building, and supporting local-area and wide-area networks in enterprisewide, multivendor interoperable environments. HLS offers network design, consulting, and integration services as well as a commercial line of network products.

HLS has one of the largest installed bases of Simple Network Management Protocol (SNMP) managers in the industry, with many enterprisewide sites exceeding 50,000 nodes. HLS introduced the first SNMP manager built on a relational data base in 1989.

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EXHIBIT HAC-2

Organizational Components

- Hughes Information Technology Company
  - HITC Headquarters, Reston, VA
  - Washington Engineering Laboratory, Reston, VA
  - Hughes Data Information System, Sea Brook, MD
  - Detroit Engineering Laboratory, Troy, MI
  - Colorado Engineering Laboratory, Denver, CO
  - Hughes Spatial Data Systems, Denver, CO
  - Colorado Springs, CO
  - Information Systems Division, El Segundo, CA
  - Spatial Data Systems Laboratory, Calgary, Canada
- Hughes STX
  - HSTX Headquarters, Lanham, MD
- Locations
  - Atlantic City, NJ
  - Boulder, CO
  - Greenbelt, MD
  - Hampton, VA
  - Huntsville, AL
  - Lexington, MA
  - New York, NY
  - Sioux Falls, SD
  - Vienna, VA

HLS has played a leading role in standards-based network management from the beginning and has been instrumental in the development of SNMP. Hughes engineers have authored or co-authored many of the Management Information Base (MIB) standards that have been adapted by the Internet Engineering Task Force (IETF). MIBs are the object data base for information collected about a network device. HLS is now

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taking the lead in specifications for Simple Management Protocol (SMP), which offers capabilities currently lacking in SNMP. This product will compete with OSI's Common Management Information Protocol (CMIP).

HLS is moving to the solution sale of integrated systems and away from the sale of components. Unlike the secrecy that surrounds HITC, HLS has begun a national marketing tour for professionals involved with networks and information management. At marketing presentations, HLS stresses that networking has entered the integration age; standards-based, open systems have created the potential to integrate enterprise, departmental, and desktop systems into a multivendor network. HLS presents its products and systems integration skills as a way for companies to participate in this new integration age.

3. Company Competitive Position

As part of Hughes Aircraft and therefore part of General Motors Corp., HITC has available an extensive reservoir of talent and experience. If the acquisition of STX is an example of Hughes' acquisition strategy, INPUT expects Hughes to acquire other organizations to further complement its current organization. HSTX was added because HITC forecasted a trend of communications becoming a dominant part of SI projects in the near term.

As part of the same company—General Motors—EDS and HITC could be powerful teaming partners for some major upcoming programs such as the Army's Sustaining Basis Information System (SBIS) and NASA's Earth Observing Satellite System Data and Information Systems (EOS-DIS). HITC needs a high-profile win to establish credibility as a systems integration partner for a company outside General Motors. EOS-DIS is estimated to be a $3 billion, 15-year project. The project will start with about 10,000 initial users.

INPUT feels that HITC will continue to win classified federal programs and that HSTX will continue to win federal civil programs and to expand its commercial earth science products. If HITC wins EOS-DIS, it will have a start in the federal civilian market. If GM and HAC continue their support of HITC and they win EOS-DIS, INPUT expects them to start marketing to state and local governments.

HAC and its subsidiaries will not divulge their SI revenue. A measure of their success is shown in Exhibit HAC-3. The low growth rate for HITC's projects and the declining margins make it imperative that it find opportunities within HSTX's civil, federal and commercial markets.

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EXHIBIT HAC-3

AAGR and Margins

Organization	Average Annual Growth Rate		Margins	
	Commercial	Federal	Commercial	Federal
HITC		5-6	S	D
Hughes STX	25	15	S	S

S = Stable, D = Decreasing

4. Markets Served

The markets served are shown in Exhibit HAC-4.

EXHIBIT HAC-4

Vertical Markets

- Earth sciences
- Federal government
- Health care
- Manufacturing
- Satellites and satellite services
- State/local governments
- Telecommunications
- Transportation
- Utilities

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5. Recent Events of Interest

In February 1992, C. Michael Armstrong, widely thought to be IBM Chairman John Aker's heir apparent, left his post as chairman of IBM World Trade after more than 30 years at IBM to become chairman and chief executive of Hughes Aircraft. Mr. Armstrong had also served on the powerful IBM Management Committee and Corporate Management Board. INPUT expects that this individual, who came from a background of IBM World Trade with a reputation for being a hard-driving marketing whiz, will show some interest in the SI and commercial endeavors of his new company.

Hughes Aircraft has stated that Mr. Armstrong's mandate is to propel commercial work at Hughes from its current 30% level to 50%, moving Hughes from being a weapons maker to being a provider of commercial services. This will have an impact on the staffing and facilities of the existing organization.

Of course, Mr. Armstrong's mandate for more commercial work must be tempered by his requirement to fight for HAC's share of the DoD budget, especially in fighter-jet radar and in missile systems. HITC's presence in "black programs" can expose it to the vagaries of the ongoing reorganization of the intelligence community.

On June 30, 1992, Mr. Armstrong announced a 15% reduction in a workforce of 60,300. This downsizing and restructuring is to continue for 18 months. This is designed to speed HAC's move towards commercial markets in a post-Cold War world.

HITC continues to get follow-on and upgrade contracts from DoD for programs such as logistic systems. Most of these programs are classified and are not easy to identify either individually or collectively.

When STX was acquired it brought to HITC an installed base in space products and in robotics, neither of which has much to do with systems integration. Recently HSTX won the rights to sell the space products from the Russian-owned ALMAZ-1 radar imaging satellite. HSTX also is marketing an articulated robot.

In June 1992, Hughes STX and ICL announced a series of security products for the PC. These commercial products are designed to bring significant information security to large PC-based corporate networks.

HLS has received a $2.1 million contract to internetwork the nationwide operations and manufacturing facilities of GE Nuclear Energy's San Jose, CA headquarters.

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Late in April 1992, Hughes Aircraft Co. reorganized its management structure into business sectors to focus attention on commercial business while making the defense units more competitive. The sectors are: Aerospace and Defense Sector, Systems Integration Sector, General Motors Programs Sector, Commercial-Industrial Sector, and Telecommunications and Space Sector.

HAC agreed to buy the missile business of General Dynamics in a transaction that would give GD at least $450 million. This will double the size of Hughes' missile business to more than $2 billion in annual sales, making HAC's missile business equal in size to the other large U.S. missile builder, Raytheon Corp.

In May 1992, HLS announced the first third-generation communication hub for remote site users. It also announced new Reduced Instruction Set Computing (RISC)-based Ethernet modules, based on Intel Corp.'s 1960 RISC chip, for its intelligent hubs.

HLS survived a protest at the Social Security Administration (SSA) and has started work on a $7 million contract to install LANs at 161 SSA hearing appeals office locations and to connect these 161 locations via WANs to a single data processing center.

6. SI Organization

Hughes Aircraft established Hughes Information Technology Company in November 1990 as a systems integration subsidiary. Its task is to pursue large-scale federal government projects and to coordinate the system integration activities of Hughes. Also, it will direct a move into the commercial sector.

HITC is currently part of the Telecommunications and Space Sector. Organization was done this way for internal business reasons. Despite the Hughes Aircraft internal structure, HITC expects to take the business lead for systems integration. It should not go unnoticed, however, that HITC has a large sibling in EDS that is also a part of General Motors. Though EDS is more interested in outsourcing than in systems integration, outsourcing vendors are always presented with systems integration opportunities by their customers.

The HITC organizational chart is shown in Exhibit HAC-5. The Hughes STX organizational chart is shown in Exhibit HAC-6.

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EXHIBIT HAC-5

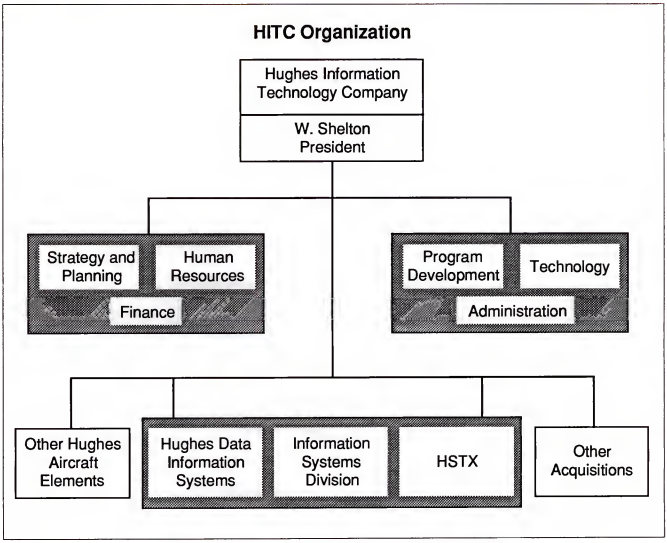

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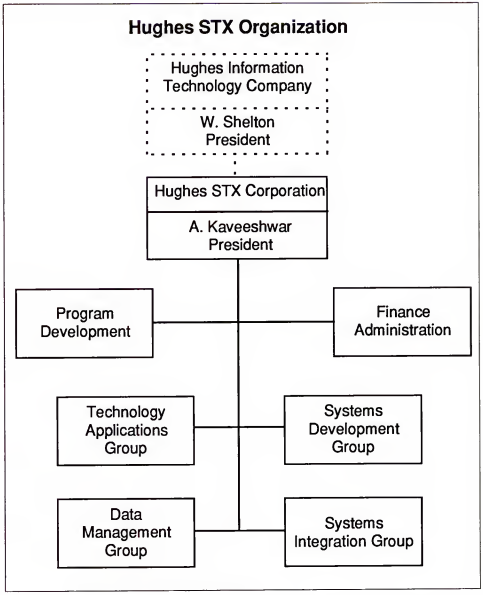
EXHIBIT HAC-6



An example of the differences that will need to be reconciled between HITC and HSTX in the way responsibilities and activities are assigned can be seen in Exhibit HAC-7. These two organizations lacked a common approach to SI management responsibilities before they were consolidated.

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EXHIBIT HAC-7

SI Contract Responsibilities Organizational Approach

Responsibilities	HSTX	HITC
Strategy and long-range planning	C	B
Marketing and promotion	D	B
Account management/sales	NA	D
Contract review/approval	C	D
Project management/control	C	D
Implementation/development	C	D
Hardware/software acquisition	B	D
Systems operations	C	D

C = Centralized, D = Decentralized, B = Both, NA = Non-applicable

Both HITC and HSTX build on their existing client base. Thus, 63% of the total average staff at HITC and nearly all the staff at HSTX are involved with system development and implementation. Only 5% of the total average staff at HITC and about 10% of the total average staff at HSTX are involved with management, strategy, and planning. There is a noticeable difference between HITC and HSTX on the percentage of total average staff assigned to project management. HITC has about 15% assigned, while HSTX assumes that it is part of the job and lacks staff specifically assigned to project management. The HSTX statistics are skewed because HSTX supplies support services for the government, which provides its own project management.

Since HLS started as a commercial business, it has retained a commercial organization. The SI component is part of the national sales organization; the regional sales managers and the director of SI report to the VP for North American Sales.

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7. SI Business Objectives

HITC's objectives are to transfer the technology and expertise it has developed in 30 years of systems integration to satisfying customers' requirements for state-of-the-art technology and applications. HITC will diversify in its major service areas of federal information systems, C^3I, geographic information systems (GISs), and earth and space sciences.

HITC's primary reasons for being in the SI marketplace are to generate revenues and profits, control its account base, generate follow-on hardware and software sales, and to respond to customer demands.

As part of HITC, HSTX will seek opportunities to leverage its experience with civil, federal and commercial sales for more and larger contracts. One promising area for expansion is seen in the growth of the "Green Revolution." This growth is generated by concern for the earth and environment and by the related dependence on earth resources, products and services provided by satellites, ground stations and enterprisewide networks.

HLS's business objectives are to establish long-term partnerships with customers and third-party vendors and to work in partnership with other Hughes divisions to research, develop, and market products for the worldwide communications market. It performs systems integration for projects in the $1 million to $7 million range. For projects larger than that it will team with core systems integrators such as EDS. HLS does not produce operating systems or industry-specific application code for computer hardware.

8. SI Capabilities Evaluation

HITC's ability to compete in the SI market is difficult to assess. It is reluctant to discuss either the nature or the number of its classified contracts.

Systems integration is a business offering that provides a complete solution through custom selection and implementation of a variety of information system products and services. HITC has broad systems integration capabilities. Except for business consulting and packaged applications software, HITC offers all capabilities required by a company from its system integrator. HITC develops 100% of its SI projects using a distributed architecture.

Exhibit HAC-8 shows the relative margins that HITC can develop from various integration components.

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EXHIBIT HAC-8

Relative Margins Integration Components

Integration Component	Relative Margins
Standard hardware and software	L
Customized hardware and software	H
Software packages	L
Consulting/design/integration	M
Custom software development	H
Project management	M
Training and education	M
Post-installation operations	M

H = High, M = Medium, L = Low

HSTX can point to several programs that demonstrate unique capabilities and give it a competitive advantage. It has had extensive experience with the products of the Landsat satellite and with non-radar air traffic control systems. HSTX has developed 50% of its SI projects based on mainframe systems and 50% based on distributed systems. This reflects the centralized processing of satellite-based products.

HSTX has extensive experience with commercial information security. This has led to development of a series of shielded desktop computers. HSTX will become the secure communication arm of HITC.

HLS will continue to pursue networking SI programs in which proprietary products such as the Enterprise Hub, MONET, LINC/Term, ProLINC, and HLS's SI experience can be used to solve enterprisewide communication problems.

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9. SI Strategic Alliances

HITC uses alliances to supplement its internal capabilities. It forms alliances on a case-by-case basis and not for the long term. HITC gains 75% of its revenue as a prime contractor and 25% as a subcontractor.

An example of an internal strategic alliance is the HITC and EDS team for NASA's proposed $5 billion EOS-DIS.

HITC has identified several companies as alliance partners. Besides EDS, they are Loral, GE, Autometric, and PAR.

HSTX has traditionally gained 95% of its SI revenue as prime contractor and 5% from support to projects managed by its clients. Like HITC, HSTX forms its alliances on a case-by-case basis. Specific-purpose HSTX alliances are shown in Exhibit HAC-9.

EXHIBIT HAC-9

Hughes STX Alliances

Company	Purpose
ICL	Packaged software and hardware
NPO Machinostroyeina	Earth imaging provider and service
Starsys	Satellite communications
Unitree	File system software

10. SI Capabilities Summary

HAC has developed its systems integration skills in a very protected environment. The company was well suited for highly classified programs because of its corporate culture. This corporate culture, combined with a DoD-wide "Cold War" mindset and ongoing efforts to consolidate HITC and HSTX, makes it difficult for the company to be open. Because of its 30 years of experience and its President and CEO, HITC would be a logical choice for some programs. Appropriate programs must be determined on a case-by-case basis.

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For federal information systems, HITC offers end-to-end information systems based on its previous experience in supporting sophisticated space missions for the federal government. The capabilities offered consist of mission synthesis, mission management, spacecraft command and control, data management and communications, mission instrument data processing, operations and maintenance, and signal processing. To do this, complex organizational structures and missions will be required.

In working with some of the world's most complex real-time integrated mission management systems, HITC has had to coordinate mission activity bases for the system user, maps and interactive timeliness for the mission planner, and telemetry and control for the mission operator. Because of the complex nature of this work, HITC has developed an exceptionally advanced data base design environment.

For C^3I systems, HITC offers more than 20 years of experience in the total life cycle of space ground systems, including: facility design and engineering, RF terminal signal distribution, computer/communications systems, systems integration, mission planning and control, spacecraft control, mission sensor data processing, operations and maintenance, and performance optimization.

The HITC national testbed communications network provides all communications requirements for multiple sites networked across the U.S. and enables distributed simulation of complex real-time scenarios in a realistic environment.

For geographic information systems, HITC offers expertise to federal, state, and local government agencies with a particular emphasis on developing products and service capabilities relevant to public safety, land records management, public transportation, infrastructure management, and renewable resources management.

In general, for earth and space sciences, HITC will use its heritage in these studies to focus on information technology supporting: global change scientific research, environmental monitoring, and archiving, management and distribution of earth observation data.

Like other defense-based organizations, HITC will need to modify its internal cost structure to allow it to compete outside the government marketplace.

HLS has taken a leadership position in designing, building, and supporting LANs and WANs. The company conducts network design, consulting, and integration for companies with complex and rapidly changing networks. This qualifies it as a company to select for SI projects that involve networking.

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11. SI Marketing Strategy

HITC was established to support large-scale technology diversification and implementation within civil and defense agencies. To accomplish this, it is headquartered near Washington DC; it is focused on large-scale integration for mission-critical systems; and it has the capability of supporting the systems building process throughout the full life cycle.

The basic strategy is to combine the aerospace and communications capabilities into a basic integration company. The SI capability will be built on HITC's successes and the new companies added to round out its total capabilities. HITC will rely on proprietary technologies in software systems to give it an edge in bidding SI projects.

Unlike other defense contractors, HAC is stressing that it wants to create new markets rather than expand into existing markets. HITC plans on more multi-agency/ bureau acquisitions of hardware with shorter buying periods. HITC also plans on communications becoming a dominant requirement in the near term.

It should be noted that these statements are being made while HAC is busy buying the missile division of General Dynamics.

HLS markets with the basic philosophy of promoting the formation of partnerships with its customers, which means first understanding their unique requirements, and then providing the best network solutions from those available on the market.

HSTX's SI competitors are shown in Exhibit HAC-10.

HITC targets the functional markets of earth and space sciences, defense and civil federal information systems, and defense C^3I systems. It expects to leverage its existing clients for new contracts 75% of the time. It has developed this relationship with clients because of its stress on high-quality customer service and its ability to deliver high-value technology solutions on time and within budget. This is reflected in its use of word of mouth and client referrals as the most successful methods of business promotion. Its dependency on this method can be traced back to successful classified programs that could not be discussed in any open forum.

HITC's SI competitors are shown in Exhibit HAC-11.

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EXHIBIT HAC-10

HSTX Competitors

Commercial	Federal
McDonald/Detwhiler (Canada)	CSC
	SAIC
	PRC
	TRW
	Lockheed
	etc.

EXHIBIT HAC-11

HITC Competitors

Commercial	Federal
Arthur Andersen	TRW
	GE
	GTE
	CSC
	SAIC
	PRC
	Martin Marietta
	Lockheed

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The marketing strategy of HLS is to position itself as capable of installing anything from value-added solutions with a market segment focus to the lower end of core system integration. HLS estimates that this category encompasses projects between $1 million and $7 million. For larger core systems integration projects—$5 million and up—HLS expects to team with companies such as EDS.

HLS will continue to serve on the standards committees for networking as part of its marketing efforts.

HLS's competitors are shown in Exhibit HAC-12.

EXHIBIT HAC-12

HLS Competitors

- Integrated Systems
  - IBM
  - DEC
  - Wang
  - HP
- Core Systems Integration
  - EDS
  - Big 6 Accounting Firms

12. SI Customer Base

HITC has inherited an installed base of DoD business from HAC and an installed base of civilian federal and commercial networking, scientific, and space business from STX. The challenge is how well these customers can be leveraged into new federal and commercial business.

A representative sample of Hughes STX's customers is shown in Exhibit HAC-13.

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EXHIBIT HAC-13

Hughes STX Customers

Customer	Application
NASA	Science and software support services Engineering analysis Data base management
FAA	Non-radar air traffic control systems
NOAA	Software systems development Systems integration
U.S. Geological Survey	Data management Science, software support services Operations management support
NOAA (Joint Venture)	Next generation weather radar (NEXRAD)
DoD	Office automation Networking Data management Systems development and integration

13. Summary and Future Directions

It will be difficult for HITC to compete in the federal and commercial SI business with the presence of a large sister organization—EDS. It can be expected that EDS will continue to pressure GM to acquire all SI and systems operations business from Hughes.

INPUT expects HITC to continue to protect its DoD investment at the expense of new commercial business. This will make it easier for EDS to expand its civil federal and commercial SI practice using HITC, HSTX, and HLS as consultants. Mr. Michael Armstrong's long-time friendship with Mr. Lester Alberthal, president and CEO of EDS, will make it easier for EDS and HITC to develop a strong symbiotic business relationship.

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HAC has restructured itself from seven operating groups into five sectors. The main design of this restructuring was to separate defense work from commercial work. It may be difficult for HAC to separate its personnel into federal and commercial organizations without a devastating impact on the overhead costs for federal proposals.

During the next 18 months, HAC will absorb the missile division of General Dynamics and will start downsizing by more than 9,000 employees. Even though most of this will take place in California and within the defense manufacturing activities of HAC, these actions are expected to have some impact on HITC and HSTX, especially on their defense activities.

It is necessary to remember that HITC is a part of Hughes Aircraft, which, with its sister organization, Delco Electronics, makes up GM Hughes Electronics, which is a part of General Motors. Given this flow down the chain of command, it is easy for INPUT to see that HITC, at times, has little control over its destiny. Decisions that are made for the good of the total enterprise often may not make sense to outside observers.

INPUT believes that it will be difficult for HITC to remain focused on systems integration now that it has been combined with HSTX. This combination adds space products, LAN security products, and miscellaneous products like articulated robots to the mix.

INPUT feels that the real test for HITC will come this summer when the EOS-DIS contract is awarded. HITC needs this win to remain creditable. The win, however, will team it up with EDS, which is nearly 35 times as large.

In summary, INPUT feels that a better understanding of HITC will emerge over the next year. Any efforts to work with HITC during this period must be done very carefully because of the potential for reorganization if it does not win EOS-DIS and the potential for severe disruption of the organization if it does win.

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